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## *Sculpture and Buildings,*

AFTER all that has been said so often about the importance of sculpture in giving the highest expression to architecture, and the almost natural fitness of architecture as the framework for sculpture, it is surprising how little serious or thoughtful attempt is ever made in this country to bring the two arts into combination in their highest forms. A larger proportion of our architecture, more especially of recent years, is without sculptural decoration of any kind externally; and in this respect we have certainly rather fallen off than advanced of late. There was a time when it would hardly have been possible that a building so large and important as the Natural History Museum, for example, should have been erected without any external sculpture further than a few grotesque spouts. During the period of architectural taste when town halls and exchanges and museums took the form of Classic porticos, they would not have been thought complete, when on any large scale, without their sculpture in the tympanum symbolical of Commerce or of Free Trade, or some other appropriate abstraction; and though it is perfectly true that many or perhaps nearly all of these sculptural decorations which pleased our fathers and grandfathers were really very deficient in interest, and that few care to look at them now, they at all events represent an attempt at giving the highest artistic expression to a building which is seldom made now; and even if the sculpture were not of the highest order it was of more interest than mere chamfers and capitals by themselves can amount to.

But the consideration of our own neglect in this respect is the more forced upon us by the comparison with what is, at all events sometimes, done in France, and is certainly never done with us. Three or four years ago, the most powerful thing in sculpture at the Academy was the model of a group executed by one of the greatest French sculptors as an architectural decoration, the "Danse," namely, of Carpeaux. This year we have a large decorative panel by another of the greatest French sculptors, Dalou; and we hear of the names of the first men in the art as employed from time to time to decorate with sculpture the works of French architects. Now this is what we do not do in England, even on the now rare occasions when we add sculpture as an important element in the design. The Albert Memorial is an exceptional instance; there sculptors of the highest eminence were invited to execute the angle groups; but the Albert Memorial can hardly be regarded as a building: it is essentially a work of art in which the practical element hardly exists, and even there the sculpture of the bas-reliefs was entrusted to sculptors who made their reputation by what they did there,—one of them, at all events, who more than justified the choice which had selected him while his reputation was still but limited. There are other buildings of comparatively recent date in London, which it is not necessary to specify by name, where sculpture forms an important element in the decoration, and in which no such fortunate result has been attained: in which sculptors of mediocre repute have been engaged, and have produced that most unbearable of all things, mediocre sculpture, which is of no good to any one; the sole advantage of which is, that at a distance it gives a certain glitter and variety to the effect of a building, but which, when more closely studied, has not a single element of interest.

We imagine that the Modern Gothic movement in England has had a good deal to do with this habit of employing stone-carvers rather than sculptors to furnish the sculptural accessories of a building, when these do form a part of the architect's scheme of design. When it became the fashion to reproduce Mediæval architecture, Mediæval sculpture was to be reproduced with it. Now, Mediæval sculpture, however interesting in a certain way, in character and feeling, never was good sculpture from the life-student's point of view; and when its reproduction was demanded, the demand was soon responded to by a class of clever and facile art-workmen or Mediæval carvers who were able to a great extent to catch the turn and trick of Mediæval carving and imitate it, but who could not have produced works which would have gained admittance in our own Royal Academy, moderate as is the standard of sculptural work there for the most part. It is probably owing to this habit of being content with stone-cutting rather than with what can really be termed sculpture that it has come to be almost an understood thing that the highest class of sculptor's work is not wanted on a building; that it is enough if the sculpture has a generally good decorative effect as a part of the whole, without being of sufficiently high class to interest us on its own merits, or to sustain scrutiny or criticism in detail.

It may be said that even so much sculpture as this is better than none at all but it appears to us that the production of work of this mediocre class adds very little to a building, and that from a sculptor's point of view it is a positive disadvantage, as encouraging mediocrity of work and of feeling. And certainly it is not the principle on which the sculptural decoration of the greatest works of architecture has been carried out. We need only mention the Parthenon,—an instance which occurs to every one whenever the subject of architecture and sculpture in combination is brought up. But that is not really at all an isolated instance. There can be little doubt that in Mediæval buildings the sculpture, *naïve* and deficient as most of it appears to us now, was not so intended; that it was the best procurable at the time and under the circumstances. In Mr. Tadema's splendid piece of architectural painting in this year's Academy, in which the bridge is really the finest and most interesting point, how much would be deducted from the effect if we removed the fine and high-class portrait statues in bronze which fill the niches on the piers of the bridge! And what was done by the Romans and the Greeks in their day, it would seem that the French are doing now. They are employing for the decoration of their buildings sculptors of the first rank, who are giving their best talents to work of this class. In our own country we rarely if ever think of this, and only in the case of some special piece of work which is rather in the nature of ornamental design than of architecture in the ordinary sense of the word. The sculptor of part of the Albert Memorial bas-reliefs, for instance, has imparted to the new fountain in the centre of King's quadrangle at Cambridge sufficient artistic interest and importance to make it worth while for visitors to waylay a Fellow of the College, and get his permission to walk over the grass to look at the fountain more closely; but it is rarely indeed that any sculpture of this class finds place as a decoration to buildings even of the most costly and ambitious type, in this country. Yet why should it not do so?

One obstacle, perhaps, is the habit of always associating sculpture with marble, a very costly material, and one which it can seldom be possible to employ in large quantities, as the decoration of a building. The best and most thoughtful of the rising generation of sculptors are, however, showing an increasing disposition to attach less importance than formerly to mere beauty of material, and to rely more exclusively on the design and feeling of their work, in whatever material executed; indeed, we have more than once heard from a sculptor a decided expression of preference for final execution in terra-cotta over marble, because the material is more flexible, and gives more readily the direct expression of the feeling of the artist in a happy moment of inspiration. This undervaluing of material must not, it is true, be carried too far; a sculptured work into which a high thought has grown is most suitably enshrined in a material of fine texture and surface, and one which is not used for every-day work. But this, perhaps, is a want we need only feel imperatively in the case of a work which forms an important and central design. A canopied fountain or monument in the middle of a square, with a figure in terra-cotta for its central object, would no doubt appear unsuitable; we should

feel that a piece of sculpture so emphasised by situation required a finer material to produce even its suitable decorative effect, considered as apart from its abstract design. But take a façade of a building which affords suitable space and suggestion for sculptural expression, at certain points, and it may surely be conceded that terra-cotta sculpture on a large scale, and by an artist of the highest class, is a perfectly suitable and practicable manner of giving sculptural interest to such a building; and the idea seems all the more suitable in reference to the increased use made of terra-cotta now in the ordinary architectural detail of a building, and which will very likely be carried still further. Terra cotta will not, however, go well with stone; brick is its proper background among building materials. But in the case of a stone building (and we sincerely hope that stone is not permanently to be neglected for brick to the extent which sometimes seems threatened), why may we not have sculpture of a high class executed (where marble cannot be afforded) in hard stone, instead of leaving this, when done, to be done in a mere mediocre and "art-workman" style? We do not believe that any sculptor of genius would despise such a material; and if executed in carefully-selected stone, and to a certain extent protected by its architectural framework, there is no reason why such work should not last for centuries; quite long enough, at all events, to make it well worth doing. This would be the more the case if the sculpture were in bas-relief,—a style of work which has not taken the place in the application of sculpture to modern architecture which it might. We are too fond of statues in the round, standing free or in niches, which offer much greater opportunities for atmospheric destructiveness, hold soot and dirt more, and are less easily cleaned, than work in rather low relief.

There is much complaint of want of patronage of sculpture in this country; many men who could do very thoughtful work are with difficulty struggling on with any small commissions they can get, anxiously looking for chances of public distinction which seem very remote and doubtful in the present state of feeling about sculpture. All this while there are opportunities of applying sculpture to architecture, which are either entirely neglected, or which are placed in the hands of artists of a quite secondary class, men who are merely more or less clever stonecutters. It may be hardly possible, on economic grounds, that the remuneration to a sculptor for work of this kind on a building could generally be quite up to the usual present scale of artists' charges, but we are very much mistaken if there are not those who would be glad of the opportunity of exercising their art in this manner even under this limitation. At all events, it would be desirable to give them, so to speak, the "refusal" of it when the opportunity occurs. The exercise of high-class sculptor's art in such work would afford an outlet for some who cannot find patrons for costly marble figures, and the gain to architecture and to the public appreciation of art would probably be very great. At present the sculptural decorations of our buildings are mostly of no real interest at all. We see in new street buildings now and then attempts at giving variety and speciality of interest by sculpture having some reference to the object of the building. The attempt is highly to be commended, but it does not seem to get into the right hands. The result is generally merely more or less effective stone-cutting, producing that kind of mediocre art which is of no value to any one. We want to tempt sculptors, properly so called, on to the scaffold of the building, and we believe there are those who would be very glad to come, if they were only invited to do so in a proper spirit.

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**Beaford.**—The parish church of Beaford, near Great Torrington, Devon, has been re-opened, after restoration. An entirely new roof has been provided over the nave; in fact, almost a new church has been erected on the lines of the old one, with the exception of retaining the principal walls. A new screen has also been erected, to separate the south aisle from the chancel. The old walls which remain have been supported by buttresses, and the old wooden roof of the south aisle has been restored. All the dressings and the pulpit are of Bath stone. The architect was Mr. Wooler, and the contractors were Messrs. Squires & Chapple, of Bideford, the amount of whose contract was 1,140*l*.

## ON THE ORIGIN OF SPECIES—(OF DISTINCTIVE STYLE)—IN ARCHITECTURE.

WHAT Species is in organised nature that is Style in architecture; and when the possibility of a new style is mooted, the question how it may healthily and prosperously originate and develop is our question of the Origin of Species,—a question as interesting in architecture as in natural history. Let us give a little consideration to the analogy. It may be that something is to be learnt by tracing how far the correspondence can be fairly maintained, and whether at last, and where, it may of necessity break down. It is not to be denied that art, with all its richness of existing and recorded monuments, cannot emulate the exuberance of nature. The zoologist and botanist give us species by the thousand that are as absolutely distinguished as our Greek and Gothic styles, but numbers do not make a difference in principles, and it is with principles that we are concerned. Indeed, the more nearly we abide by whatever limited examples are sufficient to illustrate these principles the better. Instead, then, of organised beings at large, let us take animals; and instead of animals generally, let us be content to bear in mind a few of the most familiar species, horses and dogs, with cows and cats in reserve if wanted. In a like intention of concentrating inquiry and exposition, we may leave aside particular reference to Egyptian, Indian, Chinese, or the purely barbarous forms of architecture which have much the same relation to Greek, and Roman, and Gothic architecture as molluscous and articulate animals have to vertebrates. The variable forms of Classic and Mediæval structures have sufficient range, both in number and diversity, to supply us with suggestions as to the nature of the forces that bring a style of architecture to perfection, that develope its capacities of harmony and beauty, its inborn germs of decay and ultimate regeneration in favour of some newly originated style,—some supplanting species.

A naturalist groups individuals into a species in virtue of resemblance in points that are essential to their existence and most important functions; and he draws his strongest line of distinction where he follows the most positive line of difference in nature;—precisely as in art we mark off a primary contrast between trabeation and arcuation as constructive principles. Both artist and naturalist have to disabuse the uninformed, or it may be in the first instance themselves, of some prepossessions; it is found, on the one hand, that a whale is no more a fish than a flying fish is a bird, and, on the other, that a Romanesque church on the Rhine has more affinity to Westminster Abbey than to the Parthenon or the Pantheon.

The grand test of species at last with the naturalist, is the fact that his grouped individuals "bring forth after their kind"; that grapes do not grow on thorns, or figs on thistles; that horses, let us say, do not bring forth cows or dogs propagate a progeny of cats. This characteristic he finds to accompany agreement in all the most important points that come under his observation, and to infallibly imply agreement in many more that are quite withdrawn from his scrutiny and ken; he, therefore, includes in a given species all individuals that might have a common descent. But still within the terms of this restriction, there is liberty for the manifestation of Varieties; that is, of individuals which have very marked distinctive characters which still in no way interfere with the still deeper characterics that attach them indissolubly to their species. The works of Mr. Darwin set forth with marvellous sagacity the influences which contribute to the Origin of Varieties; influences which have large operation in nature as independent of the interference of man, but which, as Mr. Darwin exemplifies, may be wonderfully promoted by human care and well-directed purpose. It is thus that varieties within a species become the commencements of Races,—of pure breeds, as they are sometimes called, within the species; characteristics of a variety become hereditary, and, according to the special values of such characteristics, breeds or races are valued. The King Charles's spaniel and Italian greyhound are dogs no less in species, however inferior in size, than the mastiff, bulldog, or wolfhound; and still, as all who know dogs know, there are no two, however, of the same race and of the greatest possible resemblance, that have not their several individual characteristics. In any case, and whatever the differences in size, shape, and specialty of instinct, a dog knows a dog all the world over, and vindicates the philosophers who assert their relationship.

So far our parallel with art may run on easily enough. We may regard the orders of Greek architecture,—the Doric, Ionic, Corinthian, as highly developed races. The operation of wild nature has its place in architecture also, when new motives are introduced at the suggestion of incidental convenience or vagrant fancy or undisciplined imitation, without regard to comprehensive and harmonious modification. For this to have place, the higher human influences must interfere; and good sense, good taste, and genius seize on the capacities for use and susceptibilities for beauty of an intrusive innovation and reduce it to order, to completeness, and maintain its effect by still further exercise of invention. Then is the world the heir of a truly organic whole, which responds at once to convenience and to sympathy. Such healthy development is still not at an end, and the individual character which each master of Doric or Ionic architecture impressed upon his particular work, may be taken to correspond to that tendency for races to develop still further secondary and tertiary races from their own varieties, even as there are terriers and terriers, greyhounds and deerhounds.

Purity of style, then, may be taken as the parallel of purity of race; but in a world where all things are in flux,—where even our appreciation of a present moment only becomes possible by concurrent consciousness of an immediately past and immediately to ensue,—it were a mistake indeed to estimate purity of style by exactness of correspondence with some well-approved antecedent. Individual character must at least be the justifying impress of an individual work, and the opportunity for this is by no means restricted, howbeit the limits have still to be observed that are imposed by the laws of race and by the ulterior and still severer law of species. Vitruvius, who laid down rules for proportion and even plans for buildings which he implies had been and were to be invariable, set the example which several of even the most original Italian architects too readily imitated, of writing specific formulas for the production of architectural dignity or beauty. This was to discourage, nay, to forbid, invention and inventive enterprise, which it had been more needful to stimulate; and better to give up all attempt at guiding, rather than not to stimulate at all. The beauty of the exemplars confirmed the error; and so it came to pass in a former generation that the maxim could be systematically propounded; "look to the books, keep as close as you can to the proportions given, and your work must look well."

Tyranny is the mother of rebellion, and oppressive restriction has to be escaped from at any risk; this is the critical moment for art; if the justly provoked and insurgent energies are happily allied with genius, the best may be expected; but otherwise authority is repudiated on the easiest of all terms by those who break loose from formulas to defy consistency. Well indeed it is if under such circumstances Art can escape a visitation of developments that bring us to a most unfavourable parallelism,—to the Mongrel. There is no more ready resource for novelty at any price and any risk than paradox; the denial of all that has been revered and accepted, without any consideration as to whether worthily revered and accepted or not. It cannot be denied that the temptations of paradox are not found to have power upon the pert alone, though it is here that the pert and,—must we use the term?—the priggish, are wont to disport most rejoicingly their airs of superiority, and do their best to persuade the world,—or failing that, to convince themselves and each other, that it was reserved for them to prove for the glory and happiness of the universe, that both are to be secured by simply turning the universe and everything severally that it contains, upside down. True eloquence, lively fancy, all that would adorn enthusiasm if truly noble enthusiasm were forthcoming, are seduced unhappily by the same temptations, and,—

> "Proud as Apollo on his forked hill
> Sits full-blown Bufo,"—

proud at first of finding that his melodious phrases will charm like the very lyre of Orpheus, till he awakens to the consciousness some day that he has at last only been proud of having collected about him,—like Orpheus,—but a sorry set of admirers and emulators. Orpheus charmed the rocks and the rivers, the birds and the

beasts, but the only other success that we read of with a more intellectual audience was when he descended very low indeed, and even in those regions his melody failed at last.

The mongrel of the naturalist is the mixed offspring of two races, of parents it may be pertaining to equally pure but to different breeds of the same species; the result is still within the species, and unfortunately retains the faculty of bringing forth after its kind, such as it is; but it is a corruption of both the races from which it springs. We are much inclined to rank as mongrel some later developments of Doric architecture, albeit they occur upon Greek ground.

So it is that pure breeds and pure styles are lost; a mongrel style may have any course of further degradation before it, like a strain of mongrel dogs that descend again from mongrels on both sides. In architecture the course of degradation has usually not been so much due to incongruous combination of elements of two styles that in themselves are pure, as to the corruption of a style already developed to considerable perfection and purity, by relapse. Barbarianism intrudes at certain epochs upon the labours of civilisation; rudeness, coarseness, commonplace makeshift take the place of high finish and elaborate adjustments in parts of a composition that at a better period would have been completed throughout with uniformly lavish expenditure and laborious study. The proper parallel to this catastrophe in animated nature is the degeneracy of the thoroughbred by an utterly unworthy cross.

And yet in neither case does the degeneracy of valuably perfected developments launch the world upon that unmitigated downward course that Horace predicts in lines which he was not prevented by the misery of their import, from working up to a most artistic if not artificial display of his "curious felicity" of expression. The health of nature's energies is not so easily extinguished; the promptings of rude convenience, the wild freaks of emancipated fancy, originate new motives by degrees, bring oblivion upon excellence that is past while stimulating an appetite for compensation in the future. Saving the reverence of all who may have set down a different opinion, we would plainly ask what else but a mongrel style is such a conglomeration of architectural solecisms as the palace of Diocletian at Spalatro; and yet even here we have a promise of that series of movements which present us at last with a newly-originated architectural species,—movements of which more is to be said. For the mongrel both in nature and art is something very different from the Hybrid. The hybrid of the naturalist is the product of the union of different species. Such production sets at defiance the law which decides the permanence of species; that law of which, let us say frankly, the origin is as inscrutable in the past as is the possibility or otherwise of its abrogation in the future. The fertility of such irregular union is as transitory as exceptional, and by this fact confirms the severity of the law. It scarcely occurs unless in the instance of the mule, as progeny of horse and ass, and the series ends at the first generation, for the fertility of the mule, if it ever has occurred, has been so rare that in all ages and countries it has been referred to with horror and apprehension as a portent. As an example of an architectural hybrid we may perhaps be satisfied with such a combination as Inigo Jones produced, when he erected a Corinthian portico as a front for the old Gothic cathedral of St. Paul. "The whirligig of time brings round its revenges," says the Clown of Shakspeare with allusion to the familiar symbolism of such wheels of fortune as we see in sculpture on the front of the cathedral at Basle; if Inigo Jones were now to look into the interior of his own noble Tuscan church of St. Paul, Covent-garden, he might perhaps be justified in retorting upon us the charge of tolerating hybridism. There are some who would sympathise with his sentiments about a transmutation that among other consequences has carried the carved furniture associated with their youthful devotions to exile in an adjacent buttershop.

The really interesting branch of our inquiry, however, concerns the process by which a genuinely admirable style is developed out of the ruins or the corruptions of the past. Such instances of hybridism as we have referred to, come no nearer to an explanation of this than did the crude theories of Empedocles to a reasonable theory of the origin of living species. The Sicilian philosopher propounds, in smooth running verse, a view of the operations of Nature which only gives her credit for some success at last by the chance results of random experiments, by the happy outcome of trials and failures like those of a persevering but most clumsy workman. Modern philosophers simplify their problem of the "survival of the fittest" by taking for granted, to begin with, that all the competitors for existence are more or less fit; and the origin of diversities of species is discussed by them on the tacit assumption that they are to be allowed one species to start with. But Empedocles imagined that, originally, members were produced separately, and fell into combination by chance. Arms, he says, existed lacking shoulders, eyes without orbits, trunks without heads; and no better combinations were rife than creatures with double faces, breasts on both sides, mismatched heads and bodies of men and quadrupeds, and so forth. The philosopher thus ascribed to Nature at her commencement a prevalence of the incongruous which, in the case of art, is rather the characteristic of periods that follow upon the days of most harmonious and successful achievement. Aristotle, indeed, used an architectural illustration to expose the fallacy of ascribing natural organisation to accident after this fashion, while we are taking the liberty to reverse the process, and would illustrate the function of architectural study by the analogy of nature. He says it were as rational a theory to suppose that, in a given building, the stone, as being the heaviest material, settled of itself at the lowest level and became the foundation; bricks came next, and fell automatically into the next position, and that no other reason need be looked for than the lightness of wood that it occupied the topmost place of all, and that so came about a roof.

If we can believe this, he says, we may accept as reasonable that it was only by accident,—as one out of many chances,—that the teeth which are adapted for biting,—the incisors,—are placed in front where they have an opportunity and are required for biting,—and those which are suitable for grinding the food already bitten off,—the molars,—have their place at the rear, and answerably in either jaw. These are among the adjustments which Democritus, — that great name which has become so oddly abused,—was never tired of tracing and admiring in nature, though he did not connect them with the operations of an intelligence. To Socrates and Plato, on the other hand, it appeared so self-evident that the marvels of nature declared the influence and operation of a presiding and designing and governing intelligence, that they did not even entertain the question whether any plausible theory could be constructed that would dispense with it. In short, they assumed,—they assume in their still living and recorded enunciations,—an architect of exhaustless resource in sagacity of design and power of execution. Aristotle was the first to fairly set the two theories face to face, and we have seen which it was that he made short work with.

Now the history of nature,—an important section of the history,—lies before us as we turn the pages and plates of the geologists and the physiologists, and on the other side we refer to a record as richly illustrated, of the structures which man has contrived from age to age for his comfort, his delight, for the expression of his highest aspirations and sympathies. We may well be struck by a parallelism of successive development in both,—of progress from simpler to more complex forms,—and even from those which excite our admiration less, to others that carry us beyond ourselves in admiration. As the ever multiplying army of students extend their ever eager and industrious research, a sequence is ever more and more completely established in the gradual elaborateness of the organism of living beings, and it is, perhaps, not to be wondered at, if even the sagacious are led to the conclusion that we have here an exact analogy to the advance, let us say, of Gothic architecture, from its rudimentary stages to its most triumphant achievements. But the comparison is too flattering to our own efforts, and involves an unfortunate misapprehension of the natural phenomena brought too violently into relation with them. The plates of the geologist may exhibit to us organisms of different degrees of complexity and beauty, but they do not exhibit a succession of failures that are gradually corrected, but ever liable to relapse into failures again. Of every extinct species, we may say, as securely as we say of every existing species, that it is complete in itself,—there is no more reason to assume in one case than the other that it had not its full complement of organs which subserved an harmonious combination of functions, and fitted it for its special place in whatever was its natural environment. Superseded they were in time: such supercession, indeed, which is without example in recorded history as the appearance of an entirely new species, may be called a matter of every day in geological; race after race became extinct, but it cannot be too distinctly recognised that the superseding species are not the old species cobbled, are not tentatives brought a little nearer to a purpose that was missed before, and waiting for still a further improvement. An ass of our own day is an ass, and was an ass to our fathers, not something that ought to have been a horse, or is going to be a horse, only that it is a failure.

But be it frankly confessed, the development of art has a history of which large chapters indeed are occupied by failures, and of which the most honourable chapters record the gradual recovery from failure, by the introduction of one modification of constructive expedient, or of ingenious arrangement, or enrichment and decoration after another. So much is this the case that some of the speculative have even been tempted to write of the history of architecture as if it consisted in this and nothing more. A little steady research is, indeed, all that is needed to enable us to set forth, with no little plausibility, how the ultimate perfection of either Greek or Gothic architecture might have been a growth, every stage of which, without exception, was but a slight advance on what had gone before, was suggested by some contingency that naturally presented itself, and met some requirement that emerged and had to be dealt with as best it might be at the moment. There is very much to this effect in Sir Gilbert Scott's exposition of the development of Gothic arches and Gothic vaulting. Certain it is that if human apprehension were as uniformly alert as it is in the most favourable instances the road would have been short indeed to many a discovery that it has taken centuries to bring about. If every hint had been seized, pursued, evolved to the uttermost, without pause or backsliding,—well,—"chapels had been churches and poor men's cottages princes' palaces,"—only they are not. We go forward, we go back, we go astray, and then we go forward again; and so it is that when our history is written we have too many pages that show only approximations to perfection, to set against the pages of the naturalist who, whether he exhibits a skeleton of an hipparion, a bird with teeth, an exquisite ammonite, or even the relics of—

> "Dragons of the prime,
> That tare each other in their slime,"

is false to himself, if he doubts that each was in full harmony with its environment, slimy and carnivorous as it might be.

Still it is the pride of architecture, as of other human arts, to be able to assert with justice that it has achievements of its own to show which, due allowance made, can fairly be brought into comparison with much that excites our awe and admiration in nature for the apt adjustment of structure to function, for the combination of most varied contrivances and distributions as contributory to one main and harmonious result, to the conciliation of stability with grace, of usefulness with beauty. Only it appears that practically this admirable result has not been obtained by mere desultory snatching at isolated improvements and occasional happy thoughts of merely limited application. When Aristotle,—we must be indulged in citing him again,—repudiates the notion that Nature's organisms result from accidental evolution, he justly says that in such case success must have been exceptional only, and yet where do we find her failures? We are at no loss when called upon to produce examples of failures in architecture, but success has ever been due to the exceptional interference of intelligence of the highest order, and the true perfecting of a style; the origination of what is justifiably regarded as an architectural species is ever the work of genius, which by its analogy to the works and ways of nature is spontaneously greeted as creative. The fossils of the art of architecture, the remains of Roman decadence, or of early Mediævalism, do present to us analogies of the Empedoclean chaos,—members only half developed, lacking requisite association with other members, or still more unluckily combined into false sets, atrophied and hypertrophied in every degree. The salvation of true

art, the reduction of such *chaos* to a *cosmos*, is witnessed, when we are able to discern that at some favoured epoch a truly organising mind was given to the world, whether his name is on record or forgotten, who had the taste, knowledge, courage, and opportunity to cancel the incongruous, recal the unworthily neglected, invent the still unexampled but indispensable complements, reconstitute arrangements, and in virtue of an infallible sense or science of proportion, whichever it may be, educe elegance out of clumsiness, and unite what was at best a rickety, if not disjointed, agglomeration of unfitting and illfitting parts into a consistent, an effective, an admirable whole.

The material upon which such organising energy was employed in days gone by, presented itself in the forms of merest crudity of which the full capabilities had not been recognised; at present the case is considerably altered. Architectural genius has worked most industriously among these stores of suggestion if it has not exhausted them, and materials for novel developments have to be looked for among examples which may well seem to have reached a final culmination. But social existence and its requirements, to which architectural propriety must always have a certain relation, never long remain without change, and therefore never long without disturbing a pre-existing harmony of such relation. It is for the restoration of such harmony that the world makes an appeal to genius; there have been many periods when the harmony was far less in need of the truly master-mind, and herein lies the opportunity for the creative architect of the present,—or if so it must be,—of the future.

In justification of the citations of Aristotle, reference is made to the second book of his "Physics," where those who can spare the time, whether architects who are philosophers, or philosophers with no pretensions to be architects, will find much to interest them.

## AS TO THE FOUNDATIONS OF BUILDINGS ON TREACHEROUS SOILS.

THE question of the area of surface which, in different descriptions of soil, should be allowed for the support of a definite weight of structure, is one which we have before now indicated as deserving of much more illustration than is at present easily attainable (see *Builder* for December 1, 1877, *et passim*). The need of more exact rules than are easily to be found has been lately experienced by a gentleman who was requested, ten years ago, to devise plans for the foundation of a large and costly state building in the United States, namely, at Albany, in the State of New York. This gentleman, Mr. W. J. MacAlpine, M.Inst.C.E., not having met with sufficient information to enable him to form any rules for determining the load which may safely be imposed by a structure upon earth of a specific character and condition, was led to go to some expense in instituting experiments for his own guidance under the circumstances mentioned. A paper, detailing the experiments and the results, has been communicated by Mr. MacAlpine to the Institution of Civil Engineers, from which we extract such information as we think may prove of value to our readers.

The building which it was proposed to erect was one, as will be seen, of considerable magnitude and importance. The soil of the spot selected for the site appears to have been unusually treacherous, or, at all events, to have given very good reason for unusual care. The area of the foundation of the building was about 24,000 square feet, but the structure, though combined as a single edifice, covered 120,000 square feet, and was so varied in the weights and pressures on different parts, that it might be rather considered as a group of a dozen of very differently-proportioned buildings. The ground to be covered sloped to the east, at an inclination of forty per 1,000, or one in twenty-five. Excavation and borings showed about 100 ft. of a particular clay, called in the locality "Albany clay," or "blue clay," which contains from 60 to 90 per cent. of alumina, the rest being a fine silicious sand. This rests upon the "Hudson River argillite," a clay slate, which forms the banks of that river for thirty miles of its course. The Albany clay contains many nodules, in the form of rings or discs, of about 1 in. in diameter, consisting of clay highly charged with carbonate of lime. Over the blue clay was a mass of earth, ranging from 1 ft. to 35 ft. deep. This was composed of a mixture of clay and sand, in varying proportions, being in some parts nearly pure sand, and quite porous, and in others almost a semi-fluid. This material occurred in veins of different thicknesses, lying at different levels, both above and below that required for the foundation. One of these veins, which were from 5 ft. to 25 ft. wide, was 200 ft. long, and passed diagonally across the excavation, at a depth of from 6 ft. to 20 ft. below the bottom of the intended foundation. This vein was dug out and replaced with clay and sand, artifically mixed, and rammed in layers, so as to make it resemble, as nearly as possible, the adjacent material. Other veins and strata of viscous matter, sometimes terminating in pockets in the blue clay, were found in the excavations. A well which had been sunk close by, to the depth of 100 ft., was entirely in the blue clay.

The material here found, in its natural condition at midsummer, contained from 27 to 43 per cent. of water. When the samples were thoroughly dried and pulverised, and again allowed freely to absorb water, they absorbed from 39 to 46 per cent. of their weight. The other clay held 40 per cent., and when dried, as the other material had been, and subsequently saturated, absorbed as much as 43 per cent. Thus the mass of the material upon which the building had to stand, in its natural condition, was quite saturated with water. The weight of the clay, if separated from the sand, was 116 lb., and that of the pure sand 80 lb. per cubic foot. The mixed earth varied in weight from 81·5 to 101·4 pounds per cubic foot; and the specific weight showed the respective proportions of argillaceous and silicious matter, and that indicated, to a certain extent, the supporting power of each locality.

The first design for the building, which was made before Mr. MacAlpine was entrusted with the direction of the work, had been for a foundation on piles; and a considerable number of these timbers had been actually procured. The use of piles, or of thick planks laid horizontally, for the support of walls, is common in Albany; but such timber is usually apt to decay within a quarter of a century. Some large buildings, after standing for twenty years, have begun to crack, and to settle, in consequence, it is supposed, of the decay of their wood basis. As might have been anticipated, in situations where the wood was always kept wet, decay did not appear, but where the moisture was drawn off, the wood did not appear to last for more than twelve years. Mr. MacAlpine felt that it was unsafe to entrust the stability of a monumental building to the support of material that was sure sooner or later to decay. Cast-iron piles, of white iron, would, he considered, be reliable for a century or more; but even these would eventually have decayed.

The adoption of the Indian method of sinking shafts and filling them with concrete was also considered, but was not regarded as admissible, as inverted arches could only have been used under part of the structure, and it was deemed advisable to have but one system of support. For the above thoroughly sound professional reasons the architect resolved to adopt the plan of which we have to give some account.

An estimate was formed of the weight of the entire building and its contents, supposing it to be finished according to the designs. We may observe here that a due allowance is made for the force of the wind on either of the façades, and call attention to this as an instance of one of those unforeseen causes for which allowance must be made in the margin that is added to all net calculations of an accurate kind. This weight is stated as 200,900 American tons. It may be explained that the Americans now generally use the round number of 2,000 pounds, instead of 2,240 pounds, for a ton. This secures a considerable advantage in simplifying calculation, though it must be remembered that the English ton is so near the French *millier* or ton (which is equal to 2,204 pounds avoirdupois, or 0·9842 of an English ton) that the metric system is more readily expressed in English than in the American notation. The area of the base of the exterior and court walls, and of the rear walls opposite, was, as before mentioned, 24,000 square feet. This gave a pressure of 6¼ tons per square foot on the basement walls. (Such, at least, is the statement of the paper; but the result of the given figures we make to be 8·33 tons per square foot.) The main tower, however, with a weight of 30,000 tons, has an area of 2,508 square feet, which is equal to a pressure of 12 tons per square foot upon the foundation-walls. The weight brought on the foundation of the division walls was 23½ tons; that on the interior walls of the towers, 39 tons; and that on the exterior walls of the corner towers, 47 tons per linear foot. Thus great differences occur in the pressure exercised on the foundations on different parts of the building,—a weight of 134 tons, which might possibly be increased, being calculated per linear foot of the walls of the main tower.

The exterior walls had a facing of cut granite, backed with rubble masonry and brickwork. This weight is averaged at 150 lb. per cubic foot. The floors are supported on iron box-girders and cross-beams, with brick arches and covering. The weight of this part of the structure is 24 lb. per square foot. The possible weight of crowds of people upon the floors is taken at 100 lb. per square foot; that of snow upon the roof at 12½ lb. per square foot; and that of the pressure of the winds on the side walls (resolved into a downward pressure on the foundations) at 15 lb. per square foot. From these data the various weights and pressures on the different parts of the building have been calculated, and are mentioned in detail in the paper, to which, when it is hereafter published in the quarterly volume of the Proceedings of the Institution, we invite the attention of those students who want to go more minutely into detail than it is necessary for us to do for the purpose of the present remarks. It is obvious that by the usual mode of enlarging the footings of the walls, and of placing the lowest course of the masonry on a bed of concrete, the weight might be distributed over an area much larger than that given as underlying the direct pressure. At the same time it will be seen that the weights are so great, as well as so varied, that any unequal subsidence under any part of the building would be likely to produce mischievous effects.

In order to ascertain the weight which it might prove certainly safe to place on the blue clay in its natural condition, two sets of experiments were made. The mode employed strikes us as original, ingenious, and very well adapted to give results which we should call minimum. With the additional precaution of checking the levels from a bench mark so distant that it could not be possibly affected by the experiment, it is probable that the results might be absolutely taken as giving the compression in the given locality; but it strikes us that it would have added to the value of the experiments if this additional precaution had been taken.

The machine employed, if so simple an appliance may be called by that name, was a mast of timber 12 in. square, held perpendicularly by guys, and supporting a cross-frame to carry the weights used. The first experiments were made upon a square foot of the foundation. A hole was dug in the bottom of the excavated part of the blue clay, 18 in. square at the top, 3 ft. deep, and 14 in. square at the bottom. Small stakes were driven in the ground, in radial lines from the centre of this hole, and the tops were carefully driven to the same level, as determined by the application of a straight-edge. Weights gradually increasing from 2,754 lb. to 23,784 lb. were placed on the framework.

The results of the increase of weights are given by Mr. MacAlpine in a table which gives every detail, as many as nine columns being filled up by the record of fourteen successive observations. The weight of the machine itself, 2,754 lb., caused an immediate settlement of 0·288 in., which, at the end of sixteen hours, had increased to 0·9 in. The addition of the first stone rather more than doubled the pressure, and increased the settlement, in an hour's time, to 1·428 in. The second and third stones, weighing together 6,260 lb., caused, in 1,314 hours, a visible uplift, the settlement increasing to 6·180 in. We do not see any notice as to whether there was any excess or uplift in the margin of an inch left between the edge of the timber and that of the bottom of the hole. On the addition of the fifth stone, making a total weight of 17,974 lb., there was an immediate settlement noted from 11·556 to 14·844 in. An uplift followed the addition of the sixth, and another that of the seventh, stones. Finally, the weight of 23,784 lb., which caused a settlement (including one noted uplift) from 18·972 to 31·2 inches, after a total time of thirty-six hours, caused no further movement in three hours

more, and the weight was, therefore, considered to have found its bearing with that amount of settlement.

It is observed that after a weight of 20,954 lb. had rested for half an hour upon the clay, a further protrusion or creep upwards was noted. The highest part of the protrusion was from 12 in. to 15 in. from the edge of the pit. Here it averaged 0·3 in. high, and sloped off outwardly at an average of 4 ft. from the centre of the hole. Mr. MacAlpine calculates that 0·606 of a cubic foot was then uplifted, which was equivalent to a displacement of 7·272 in. When a weight of 23,784 lb. had been applied, and had rested three hours on the clay, the ring had risen by 0·5 in., showing 1·01 cubic feet of earth raised, being equal to a displacement of 12·12 in. under the foot of the mast.

It is the inference of the author that the first action due to the pressure was that of compression of the material. After the load reached 7,000 lb. or 8,000 lb., the displaced earth endeavoured to escape in a lateral direction, and thus caused the uplifting of the surrounding surface. The small size of the area under pressure made this escape more easy, and Mr. MacAlpine says that if the pit had been deeper, or the piston larger, there would have been less external displacement.

The second set of experiments differed from the first only in the larger size of the area put under pressure. A base of 3 ft. square was framed to the mast, and the weighting and observations carried on as before. The pit was 38 in. by 38 in., both at top and bottom, and 2 ft. deep. The stones were put on at intervals of an hour. In these second experiments no lifting of the surrounding earth occurred. The settlement increased with much regularity, in proportion to the increase of the load; and as the earth became more compact the proportionate settlement diminished. When the pressure per square foot corresponded pretty nearly with that of the second observation on the smaller area (a little more than a ton on the square foot) the settlement was nearly equal. The outside pressure employed in this series of experiments was 29,878 lb., giving a weight of 3,320 lb. per square foot. The total settlement then noted, in about an hour from the imposition of the weight, was 0·825 in. When this is compared with the settlement of 0·9 in. after fifteen hours' pressure of 2,754 lb. on the smaller area, it will be seen that the extent of superficial area covered has to be taken into account, as well as the actual weight per foot. If a pointed pile had been substituted for the square foot of surface, there can be little doubt that, at all events for a certain distance, the descent would have been more rapid than was actually the case; and a foot square of area is but a point where it is compressed with weights and bulks such as those of the building to be erected at Albany.

The inference drawn from the experiments by Mr. MacAlpine is, that the extreme supporting power of the earth on which he experimented was less than six tons per square foot, and that the load which might be safely imposed upon the clay was two tons per square foot. Considering the action to be that of compression only, and not of displacement also, we deduce from the second table the results, that a weight of one ton per square foot actually caused a settlement of 0·54 in.; and a weight of 30 cwt. per square foot a settlement of 0·83 in., so that a weight of 2 tons per square foot would give a settlement of at least 1·1 in. We do not say that a settlement of this amount, if permanent, would be alarming. But it cannot be denied that in the case of a building of which some parts are much more lofty, and consequently heavy, than others, such a compressibility in the soil on which it stood would be a matter of very serious concern. We thus find that the original idea of footings covering 24,000 square feet, and sustaining a weight stated, as before mentioned, at 6½ tons per square foot, would have been very far beyond the limit of safety. With a pressure of a little under 7 tons per square foot, in the first experiment, a settlement of 11½ in. was obtained, and the earth was then in such a state that an additional ton per foot produced an immediate settlement. When what we may call the absolute reliability of foundation is so small that the imposition of a weight which does little more than double the atmospheric pressure produces an inch of settlement, without any observed upheaval, it is clear that we are in presence of a practical problem of extreme delicacy, as well as gravity.

Mr. MacAlpine remarks with perfect justice that it is not so much absolute settlement which is to be apprehended, as a greater yielding in one place than in another. The method which he adopted in the case in question has an interest of its own, independent of the wider question on which his experiments are calculated to throw light. Considering that a change in the hygrometric condition of this particular material would be a direct cause of movement under a sustained pressure, he took steps for maintaining the clay beneath the building in the same condition of moisture. This is somewhat of a novelty in architectural practice, and it will be a matter of much interest to find how far the plan adopted answers the view of the designer. As, in a case of this kind, no news will be good news, we sincerely hope that the present generation, at all events, will have no further light on this particular experiment than that which may result from absence of change. A deep puddle-wall was extended entirely around the foundations, in order to prevent either access or egress of water, and to maintain, as far as possible, the exact proportion of moisture existing in the ground before it was built on. The puddle-wall was carried up to the level of the terrace which surrounds the building. To prevent the accumulation of rain-water within the space thus inclosed, a depth of 6 in. of coarse-screened gravel was spread over its entire area, with the idea that "under the great weight of the building any excess of water on the clay beneath will be forced into this pervious gravel, and flow off through it to the drains which encircle and traverse the foundations." We have here to remark that it appears to us to be a question how far the saturation before described is of a mechanical, and how far of a chemical, character. If the second affinity exist, the mere pressure of the building would probably be of comparatively little avail to prevent absorption. We do not wish to offer any criticism on a work which has evidently been deeply studied by the designer; or on his careful experiments for the guidance of which he has drawn observations which are of such high professional value. That value, however, is even higher, inasmuch as it may show the builder on mixed soils the necessity of positive experiment, as to each particular locality, before he imposes any considerable weight on his foundation, than if it be regarded only as giving a measure of the reliability of the particular material known as "Albany blue clay." And with reference to the more general question, particularly considering the extension which has to be given to the footing courses of the loftier parts of a complex building in order to reduce the vertical pressure on the ground, the question suggests itself whether it would not be safer to provide against the percolation of any rain water into the area, by the use of concrete, of asphalte, or even of puddle (if the area be very large), than to contemplate any squeezing out of water once permitted to enter the ground, by the incumbent weight. The author adds: "The necessity for these provisions will be apparent when it is considered that many of the veins of sand extend to the surface of grounds of much greater elevation than the foundations, and that they communicate with imperfectly-built street sewers and water-pipes; while the main or other porous veins extend beneath the surface to grounds which are much lower. Through these sources the clay under some portion of the structure might be charged with water, while that under an adjacent wall might, at the same time, be drained of much of its natural moisture, and thus entirely destroy the design of a foundation which should everywhere have an equal sustaining power."

We are not informed in the paper what was to be the cost of the "large and costly State building" which forms, or is to form, the new Capitol at Albany. But, as 6,656 cubic yards of concrete would cover the entire area to the depth of 18 in., it is worth inquiry whether the preparation of such a substructure might not be found, under some circumstances, a true economy. It is probable that this idea was duly investigated in the case in question; but we throw out the suggestion for the sake of the thorough discussion of the subject. The cost of the puddle wall would be an appreciable deduction from the cost of the floor of concrete.

Mr. MacAlpine has constructed a third table, which may very well be taken as a normal type by the architect who has to consider the important question of providing foundations of equal resistance for connected walls differing greatly in their weight. He has classified the different walls of his building in seven groups, in which the load per lineal foot rises from 8½ to 47 tons. He then places, in another column, the width of the several walls, rising from 2 ft. to 7 ft. He allows from two to five courses of footings; and an under course of concrete, proportioned to the weight in each case. Thus the walls, which are 2 ft. thick, and which have a weight of 8½ tons per lineal foot, have footing courses of 2 ft. 2 in. and 2 ft. 5 in., and a concrete course of 4 ft. 3 in. wide. The main walls, of 7 ft. thick, having a weight of 47 tons per foot run, have five courses of footings, increasing from 7 ft. 4 in. to 15 ft. 8 in. in width, with a concrete bed of 23 ft. 6 in. wide. It may be remarked, with reference to our former remark as to a concrete platform, that the quantity of this material actually employed must be enough to cover no inconsiderable proportion of the area.

## CAST-IRON TOWERS AND THE ARCHITECTURAL THEORY OF LIGHTHOUSE CONSTRUCTION.

WE brought before our readers in March last some account of examples of each of those four distinct types of lighthouse which have been built, often under circumstances of extreme difficulty and danger, on reefs or single rocks exposed to the fury of the waves. We have now to call attention to a fifth form of design, which, although, as experience proves, it is quite unfitted for such a site as that occupied by what may be fairly termed the queen of British light-towers, Skerryvore, may be suitable for erection on a lofty promontory, such as that occupied by the tower of Ardnamurchan.

Considerable difficulty has been experienced by many persons, including manufacturing firms, who have sought for information as to the details of cast-iron lighthouses, in obtaining it. We have the more satisfaction in reproducing some account of the cast-iron lighthouse tower on Gibb's Hill, in the Bermudas, which was erected, in 1845, on a plan similar to that of the tower previously erected, in 1841, by the late Mr. Alexander Gordon, on Morant Point, Jamaica, which is marked F in the illustration of our group of lighthouses.*

Some account of this tower was communicated to the Institution of Civil Engineers on February 12th, 1856, by Mr. Peter Paterson; and the report of the reading and discussion of the paper, in which Mr. Gordon took part, will be found in vol. ix. of the Proceedings of that body.

The base of this lighthouse is at an altitude of 245 ft. above the level of the sea, being situated on the top of an elevation called Gibb's Hill, on the southern point of the Bermudas, in latitude 32° 14′ N., and longitude 64° 50′ W. of Greenwich. The figure of the tower is conical, the height being stated at 105 ft. 9 in., and the lowest and uppermost diameters (which Mr. Paterson has not figured), measuring to scale about 24 ft. and 14 ft. respectively. A cavetto or curved moulding, on the top of the narrowest part of the frustrum of the cone, supports a ring of iron of 20 ft. diameter, which is surrounded by a light iron railing, and forms a gallery round the lantern.

The external shell of the tower is constructed of 135 curved plates of cast-iron, including those for the doorway. These plates appear to measure 8 ft. in height by an average of 4 ft. in width; and they are stated to vary in thickness, from 1 in. at the base to ¾ in. at the top. They have cast-iron flanges, which project 3 in. inwards; and are strengthened at intervals of 12 in. by angular feathers, ½ in. thick. The holes for bolting together the flanges were all drilled, 6 in. apart, and the plates are bolted together by square-headed screw bolts, ¾ in. in diameter, with proper nuts and washers.

The centre of the tower is occupied by a hollow column of cast-iron, 18 in. in inside diameter, and ¾ in. thick, cast in nine lengths, each provided with circular flanges, which are bolted to each other and to the floor plates. At 2 ft. above each floor there is a man-hole opening into this column, 26 in. high and 15 in. wide, fitted with wooden doors. Thus the column is used, during the day time, by way of lift, and it also contains the waste-water pipe.

The bottom of the tower, for 20 ft. in height, is filled with concrete; with the exception of a circular well in the middle, of 8 ft. diameter

* See p. 257, *ante*.

faced with brickwork. There are seven floors, exclusive of the lantern floor, each 12 ft. apart. The first and second floors are cased with brickwork, and serve as oil and store rooms. The five upper floors are lined with sheet iron, No. 16 gauge, disposed in panels, with oak pilasters, rails, and skirtings. On the first floor there is a cast-iron kerb, 10 in. wide and 1 in. thick, to which is bolted a ⅝ cast-iron floor-plate. The second floor consists of the radiating cast-iron plates, ⅝ in. thick, bolted to the flanges of the columns, and resting on the brickwork. From the third to the seventh inclusive, the floors are constructed in the same manner, except that they rest on the flanges of the outer plates forming the tower, which they thus connect with the central column. These are all bolted together with ¾-in. and ⅜-in. bolts. The eighth floor, and the footway, each consists of sixteen cast-iron radiating plates, ¾ in. thick, bolted with ½-in. bolts. The plates are so arranged as to allow room for the passage of a spiral staircase.

In each floor are five windows, one in the centre of every alternate plate. They are 18 in. square, fitted with strong wooden ports, opening outward, and containing each a plate of polished plate glass, 9½ in. square. There is also a window of the same dimensions in the circular well, making thirty-six windows in all.

The staircase consists of two wrought-iron tringers, 1⅜ in. square, the risers and supports being ⅝ in. thick, and the treads of oak 1½ in. thick. To each step is fixed an iron baluster, ¾ in. in diameter; on the top of which is fitted a wrought-iron hand-rail, 1⅜ in. wide, and ⅝ in. thick. The staircase rises spirally round the central column from the doorway to the first-floor, and round the outer side of the rooms, close to the casing of the tower itself, from the first to the eighth floor. There are standards and rails round the headways of all the floors. The standards are of wrought-iron, 3 ft. 6 in. in height, and tapering from 2 in. to 1½ in. in diameter. There are five of these standards on the first, and three on each of the other floors.

A wrought-iron ring, in four pieces, 5 in. wide, and ⅝ in. thick, is attached to the eighth floor, and to this the lantern and light room are bolted. The height from the gallery to the top of the lantern is 17 ft., making the total height of 378 ft. 9 in. above high water. The light is visible at a distance of twenty-seven miles. The cost, according to a Parliamentary return, was 7,689*l.*, of which 2,252*l.* was expended in Bermuda. The first parts of the lighthouse were landed in Bermuda about the end of November, 1844, having been previously fitted and erected in the yard of the builders, Messrs. Cottam & Hallen. The last plate of the tower was fixed on the 9th of October, 1845.

From this year's edition of a "Description and List of the Lighthouses of the World," by Alex. G. Findlay, F.R.G.S., published by Laurie, 53, Fleet-street, we ascertain that the lighthouse on Pembroke Point, Falkland Isles (of which we gave the elevation in our group of lighthouses), is a tower 60 ft. high, with white and red bands. The light is at an elevation of 110 ft. above high water. It was established in 1855, and is visible at a distance of fourteen miles. With regard to the Jamaica lighthouses, that at Plum Point, Kingston, is only given by Mr. Findlay as 68 ft. above the level of the sea. Our elevation must, therefore, be that of the Morant Point Lighthouse, in that island, in accordance with the elevation of that tower on Mr. Gordon's design. It is a "white iron tower, 96 ft. high, on the eastern extreme of Jamaica, and was built in 1842; the light is 115 ft. above high water, and is visible at a distance of fifteen miles."

We are happy to be able further to supply some of the details of the designs for the iron lighthouse on the Great Basses rock, Ceylon, from an account given by Mr. William Douglass, M. Inst.C.E.* In a circular relating to lighthouses, lightships, buoys, and beacons, issued by Mr. Alexander Gordon, in 1863, is a remarkably ungainly elevation, entitled "Great Basses." From the middle of a round, battlemented, iron tower, measuring 31 ft. in diameter, and 35 ft. high, rises an iron turret, some 12 ft. in diameter, and 84 ft. high from the top of the battlements to that of the lantern. A half elevation and half section of the tower are shown by Mr. Douglass. It was not erected, but may serve as an example of the details of this class of designs. In July, 1855, the late Mr. Gordon was instructed by the Board of Trade to prepare and submit plans and estimates for a lighthouse on the Great Basses, a dangerous reef lying eighty miles to the eastward of Point de Galle, and six miles from the nearest land, Kirinde; and to consider the relative expense and advantages of stone and iron as materials for constructing the same. The design submitted in consequence is described by Mr. Douglass as that of a cylindrical iron tower, secured within an enlarged basement of masonry or brickwork. The basement was enclosed within an outer casing of cast-iron, 2 in. thick; and both the tower and the casing were sunk in the rock. The basement was to be 30 ft. above the rock. The brickwork inside the cast-iron casing was to be set in bitumen, worked hot, and bonded to the outer shell. In order to prevent salt water remaining in contact with the cast-iron shell at its junction with the rock, it was proposed to provide an outer enclosing ring, or plinth, about 2 ft. high, leaving an annular space, about 1 ft. wide, between the plinth and the casing of the basement, which space was to be filled with heated Trinidad pitch, mixed with sand and small gravel. As each course of plates of the basement and the portion of the tower within it was laid and bolted together, the interior was to be filled up to the same level by large Ceylon bricks, 12 in. by 6 in. by 4 in., set and jointed solid in Trinidad pitch, mixed with an equal quantity of sharp sand, and applied hot. The inside and outside of the ironwork were to be well paid over with the same, and the space between the iron and the brickwork was to be carefully run in at every course of bricks with the same hot bituminous mixture. Accommodation for the keepers was to be provided in and upon the basement, the plateau of which could be covered at pleasure with an awning. The cast-iron shaft, 12 ft. diameter, built of plates 1 in. thick, and lined with thin wrought iron, secured to the internal flanges, was to be surmounted by a lantern and apparatus for a revolving catoptric light, at 120 ft. above high-water. The total cost of the work was estimated at 15,673*l.* 15s., and it was considered that it could be completed in eighteen months.

The substitution of granite for the basement occasioned an addition to the estimate of 4,000*l.*, and to the time requisite, of four years and a half. The employment of a steamer was also decided on, at a further increase of cost, and the estimate finally approved amounted to 33,946*l.*

In March, 1856, the late Mr. W. W. Poingdestre, Assoc. Inst. C.E., having been appointed resident engineer, left England for Ceylon to carry on the operations. The granite base, iron tower, illuminating apparatus, and lantern were prepared in England, and despatched to Galle, where they were landed and stored. It proved, however, that the difficulties of the work had not been properly appreciated. After three years, only a few landings on the rock had been effected, and nothing had been accomplished beyond the erection of a beacon mast, 60 ft. high, with a ball on the top; and the marking out of the site of the proposed lighthouse. In 1863, 40,000*l.* had been expended, and it was estimated that 20,000*l.* per annum for five years would still be required. The work was, in consequence, dropped.

The account of the stone lighthouse designed by Mr. Douglass, which was commenced in March, 1870, and lighted on 10th of March, 1873, at a total cost of 62,039*l.*, with the addition of 9,526*l.* as the cost of the granite for the base, delivered at Ceylon, does not come within the limits of our present task.

The above very costly experience throws a most valuable light on the question of the material which should be selected by the architect for the construction of lighthouses. Without going so far as to say that cast iron is in no case applicable for the erection of a tower, it is certain that in the instance of a tower springing from a rock exposed to the fury of the sea, masonry is the only work on which the architect can with safety rely. On this subject we cannot do better than call attention to the remarks of Mr. Alan Stevenson, engineer to the Board of Northern Lighthouses, in his "Rudimentary Treatise on the History, Construction, and Illumination of Lighthouses," published by Weale in 1850. Mr. Stevenson's high authority, as one of a family of lighthouse builders, the son of the engineer of the Bell Rock and Wolf Rock light-towers, and himself the designer and builder of the Skerryvore, is not less conclusive than his scientific argument. Bearing in mind the constant tremor to which a building of the kind is exposed from the beating of the waves, Mr. Stevenson lays down the axiom that it is on the mass and weight of the structure that its stability depends,—not on its mere cohesion. Masonry, therefore, so put together as to form the most compact mass, and most closely to resemble a monolith, is beyond all doubt or question the only proper material for a sea-springing light-tower.

The first person who endeavoured accurately to register the force of the waves was Mr. Thomas Stevenson, a description of whose Marine dynamometer is given in the Transactions of the Royal Society of Edinburgh for January, 1845. During the five summer months of 1843 and 1844 the average indications registered at different places near Tyree and Skerryvore gave 611 lb. of pressure per square foot of surface exposed to the waves. For the winter months, in the same localities, the average pressure was 2,086 lb. per foot, or three times the summer resistance. The greatest pressure registered at the Bell Rock has been 3,013 lb.; at Skerryvore, 30 per cent. more, or 4,335 lb. per square foot, has been registered, and in a foot-note Mr. Stevenson adds that results as high as 6,000 lb. per square foot have since been ascertained.

Thus, taking for the sake of calculation a cylinder of granite, 25 ft. in diameter, and 10 ft. high, its weight would be about 380 tons. Supposing this block to be immersed in water, its weight will be diminished by 140 tons, leaving 240 tons. Taking the force of 4,335 lb. per foot on the largest vertical section of this solid, we obtain a pressure of 484 tons. This, according to the consent of the best authorities, is reduced one half by the cylindrical form of the plan, which throws aside the full impact of the waves. We thus obtain a displacing power of 242 tons, against a resistance, from weight alone, of 240 tons. But it is an evident error to suppose the tower to be at the same time surrounded by water, and exposed to the full force of the waves. Again, the stability of the mass, as against any effort to topple it over, will be regulated by the ratio of its base to its height, which was taken at 2½ to 1. In order, therefore, for the waves to be able to overturn such a column, the pressure of the sea, instead of being 240 tons, must be 600 tons. With regard to any tendency to slide the tower on its basis, the experiments of M. Rondelet (in "L'Art de Bâtir") show that the friction of a block of stone sliding on a chiselled floor is equal to seven-tenths of its weight, so that we should have a resistance, from gravity and friction alone, of only 168 tons, or seventy-four tons less than the estimated pressure. Against that excess of force has to be balanced the abutment secured by the sinking of the lower courses into the solid rock, the adhesion of the mortar, and the use of the joggles, bats, dovetails, or other appliances by which the masonry is bound together to itself and to the solid rock.

It may thus be taken as an axiom that for a lighthouse springing from a rock exposed to the fury of the waves, stone is the only fit material, and the larger the blocks that can be obtained, and the greater the specific gravity of the stone, the better for the purpose. The granite used at Skerryvore is of the weight of 13·62 cubic feet to a ton.

The next consideration is as to form. The first element, the height of the lantern, is to be determined by the distance for which it is desirable that the light should be visible. That ascertained, it follows, from what has been before stated, that the stability of the tower depends (other things being equal) on the low position of its centre of gravity. This indicates the cone as the true form. But as the forces to which the several horizontal sections of the tower are exposed decrease in a rapid ratio from the bottom upwards, the true form of the entire shaft will be that of a succession of conic frustra, so that either a true conic section or some other geometrical determinable curve will be the proper outline for the tower.

Without going here into mathematical detail, it will be well to cite the result of Mr. Stevenson's solution of the problem. In the Eddystone tower the radius of the base, at the level of high-water of spring-tides, is somewhat less than one-fifth of the height of the tower above that level. In the Bell Rock the corresponding radius is little more than one-seventh of the height. If the curves of these two towers be continued downwards to low-water level, the radius of the Eddystone at that point may be

* Proceedings, Inst.C.E., vol. xxxviii., part ii., p. 50.

taken at about one-fourth, and that of the Bell Rock tower at about one-fifth, of the height. The height of the Eddystone tower, it will be remembered, is 68 ft., that of the Bell Rock tower 100 ft., that of the Skerryvore tower 120·25 ft., measuring the masonry alone in each case. The greatest area afforded by the Skerryvore Rock allows a radius of 22 ft. at a level of 4 ft. above high water; and to that dimension, which gives a tower slightly more slender than that of the Bell Rock, Mr. Stevenson conformed his plans.

The investigation made by Mr. Stevenson of the relative advantages of a simple conical frustum, and of a solid bounded by each of four several mathematical curves, is of such value that we reproduce the results. The economic advantage of any proposed tower of given height, and diameter at base and at top, is considered to be inversely as the mass, and as the height of the centre of gravity above its base. This is represented, taking M to signify mass, and G, distance of centre of gravity from base, by the fraction $\frac{1}{M\,G}$; and the comparative economic advantage of any two towers will be expressed by $\frac{M\,G}{M^1\,G^1}$, as in the last column of the table.

| Form of Tower. | Height of Tower. H. | Diameter at Base. | Diameter at Top. | Volume of Solid Tower. M. | Distance of Centre of Gravity from Base. G. | $\frac{H}{G}$ | Economic Advantage. $\frac{M\,G}{M^1\,G^1}$ |
|---|---|---|---|---|---|---|---|
| | ft. | ft. | ft. | cu. ft. | | | |
| Hyperbolic | 120 | 42 | 16 | 62·915 | 41·227 | 2·911 | 1·00000 |
| Conchoidal | 120 | 42 | 16 | 62·984 | 41·336 | 2·903 | 0·99627 |
| Parabolic ... | 120 | 42 | 16 | 63·605 | 43·400 | 2·765 | 0·93963 |
| Logarithmic | 120 | 42 | 16 | 74·742 | 42·460 | 2·826 | 0·81608 |
| Conical ... | 120 | 42 | 16 | 84·737 | 43·280 | 2·773 | 0·70725 |

To this very valuable table may be appended a tabular comparison of the three great works of Smeaton, Robert Stevenson, and Allan Stevenson.

| Lighthouse. | Height of Tower above first entire course. H. | Contents of Tower. | Diameter at Base. | Diameter at Top. | Distance of Centre of Gravity from Base. G. | $\frac{H}{G}$ |
|---|---|---|---|---|---|---|
| | ft. | cub. ft. | ft. | ft. | | |
| Eddystone... | 68 | 13·343 | 26 | 15 | 15·92 | 4·27 |
| Bell Rock ... | 100 | 28·530 | 42 | 15 | 23·58 | 4·24 |
| Skerryvore | 1,385 | 59·580 | 42 | 16 | 34·95 | 3·96 |

The cost of the Bell-rock Lighthouse was 61,331*l.* 9s. 2d., and that of the Skerryvore 83,126*l.* 12s. 1d.

It is at once evident from this investigation of form, that cast iron, unless it were in solid blocks, is not an appropriate material for the construction of a tower on a spot accessible by the waves. Such a building would rely, not on weight, but on cohesive power. The plates would be liable to fracture if a spar were washed against them in a heavy sea,—a not improbable occurrence. It would be only as affording a sort of skin for a masonry or brickwork core that the material could be contemplated. But such a use of it would be inconsistent with the true form, above shown to be proper, except on the condition that each tier of plates was to be cast from a separate pattern,—a condition which would not only add considerably to the cost at the foundry, but would cause endless trouble and delay in the putting the work together in a confined position. And, when all was done, the slow, unceasing erosion of the material by the salts of the sea would have only commenced. The material is perishable, as well as otherwise unsuitable for this kind of structure.

The only advantage possible is that of a reduced cost, and in cases like those of the Red Sea lighthouses we have seen how the materials can be prepared in England, so as to involve the least amount of labour possible in an inaccessible spot. But the question of permanent durability is not less important than that of cost, and that has yet to be decided, even with regard to the Dædalus and Ushruffee open towers. Again, when we see that two works of very different proportions, each involving so hard and perilous a struggle with the elements, have cost so very nearly the same, per foot of height as the Bell Rock and Skerryvore towers, we have very good reason for the opinion that the minimum of cost consistent with the permanent character of the work has been obtained. The Bell Rock tower cost about 56 per cent. above the estimates, which must be considered as wonderfully close, considering the want of precedent for such a work. But the Great Basses iron tower was in a fair way of costing ten times the original estimate, or more than twice the cost per foot run of the two Stevenson lighthouses, when the work was stopped; if, indeed, it could have been executed at all.

We add, on the authority of Mr. J. N. Douglass, that the cost of the original Eddystone tower, containing 13,341 cubic feet, comes out as 2*l.* 19s. 11¼d., or within ¾d. of 3*l.* per cubic foot. That of the Bell Rock was 1*l.* 19s. per cubic foot. That of the Great Basses, as built, and containing 47,808 cubic feet, at the low figure of 1*l.* 6s. 7¼d. per cubic foot. The Wolf Rock, another of Mr. Robert Stevenson's towers, cost only 1*l.* 8s. 2¼d. per cubic foot.

## FROM THE BANKS OF THE SEINE.

IN the professional world, while the several important questions lately discussed at the recent Architectural Congress are receiving more mature consideration, the address delivered at the closing meeting of the congress by M. Ravaisson (curator of the Musée des Antiques), on the "Teaching of Drawing," cannot fail to rouse much serious reflection. The predecessor of the present Minister of Fine Arts had taken active measures to extend the teaching of drawing, and the impulse then given still continues. Architects, as M. Ravaisson observed, might do much to aid this artistic movement; their valuable opinion will certainly be asked. It is in the recent International Exhibition that must be sought the reason for this active Government solicitude in questions touching the teaching of drawing. For a long time France held without opposition the first place in all those industries in which artistic skill was necessary. But it has been impossible for the French not to observe in the last Exhibition of 1878 that foreign nations had made such progress that the preponderance of France in matters of taste and artistic sentiment was seriously menaced, and it has been seen that means must be taken to re-establish the old supremacy. With this object, as M. Ravaisson truly observed, the perfecting of the system of teaching of drawing is necessary, after the example which foreign countries have been able to give to France. Taste, as the eminent member of the Institute observed, is not alone necessary in the director of the workshop, it is as equally indispensable in the workmen and artisans who carry out the conceptions of their employer. It is, therefore, to everybody that an appeal must be made to develop at an early age the sentiment of the beautiful. It is not our intention to enter into M. Ravaisson's interesting address in detail. The *Annales* of the Société Centrale will publish the lecture in entirety. The chief point in M. Ravaisson's discourse consisted in demonstrating the importance of the education of the eye. Michelangelo often repeated to his pupils the phrase now become so familiar, "You must always have your compasses in your eye." To the architect the question of the more universal teaching of drawing is one of the utmost value, not alone in France, it may be observed, but in England, where the effects of an even more widely-spread knowledge of drawing could not fail to produce a salutary influence both on the artistic and the industrial world.

Only a few hours later M. Viollet-le-Duc, in distributing the prizes at a Parisian municipal drawing-school for young girls, urged in no less earnest, even if not so technical, a manner, the importance of the study of drawing. We are indeed happily far from the days to which the eminent artist referred, when the power of drawing was regarded for young ladies as an accomplishment, available alone for the occupation of spare hours. The time has come when drawing must be considered as necessary an acquirement as writing. M. Viollet-le-Duc warmly deprecated the custom of teaching drawing from the flat. From the very first steps, the pupil, he urges, must be taught to see and understand what he sees, at the same time that the hand is trained. Place the pupil before the real object, in order that by observation his intelligence may seize the form and its properties, and endeavour to reproduce what he sees. Rude as are often the first results of such a method, it remains for the teacher to explain to his pupil any difficulties that may arise: in this manner will be cultivated the faculty of observation,—the first quality of the draughtsman. As M. Viollet-le-Duc observed, could such a result be obtained from a study of a graphic model? The power of drawing, and the faculty of observation, the eminent artist further urged was as equally useful to the woman as to the man. He additionally deprecated the mere desire to attain a degree of power sufficient to gain prizes. Satisfaction with this first difficulty overcome, is equivalent to retrograding. In the practice of drawing, perfection is never attained. It is a long and difficult road the end of which is never reached, but in which each day a fresh advance should be marked. He who dares to say "I know how to draw," would be uttering a folly; "I draw" is the sole affirmation which is allowable.

Never within the memory of even respectably aged Parisians have the papers had so much to say about England and the English, as since the recent visit of the Literary Congress and the Comédie Française to the banks of the Thames. For the first time Parisians and French people alike have listened with patience to lengthy descriptions of the house of Shakspeare, Lord Mayor's banquets, of even such essentially un-Parisian subjects as a visit to Oxford, or to Mr. Darwin and the Charterhouse School; while as a last arrival, English residents learn with pleasure of the successful impression produced on the French by Mr. Irving's acting. M. Francisque Sarcey's opinion on that favourite actor is already known. M. Milliet, a young musical author, has recently been despatched by the *National* to watch the success of a certain new opera by a French composer. M. Milliet is not kind in speaking of Covent Garden as the "theatre of the high life," or of the orchestra, which we cannot but think he calumniates when he says that the "violinists play out of tune, introduce fantasies of their own composition, and sometimes change their instruments, taking from their pocket a cornet-à-piston, according to the requirements of the piece." Nor is M. Milliet less kind in referring to the scenery, and he assures his readers that rehearsal is unknown at Covent Garden. "They are very good provincial representations." But the evident professional blindness,—for serious comparison between the Grand Opera in Paris and those in London is scarcely possible,—which appears to have entirely destroyed the critical powers of M. Milliet in operatic matters, is absent when he speaks of Mr. Irving. "Ah!" cries the French critic, "we are wrong to believe that the power of the Théâtre Français exists alone in the Rue Richelieu." That morning only the critic had met Coquelin, the well-known actor, and had asked him if he had been to the Lyceum Theatre. "No, I have not yet been," he replied, nor do I want to go. I know those people [*ces gens-là*], and I know what they can do. The *Hamlet* of the favourite manager of the Lyceum especially pleased M. Milliet, the scenery, the taste, and perfection of the secondary parts; the *Ghost* particularly struck him. After a lengthened panegyric of Mr. Irving, and his artistic power, his absence of affectation and rant, and the charm of Miss Terry, "why do not," he continues, "the *artistes* of the Comédie Française go to the Lyceum?" It is even rumoured that Mr. Irving will shortly be invited over to France; if so, we quote again from our now amiable critic,—"I feel convinced that the Shakspeare of the English will be even more highly spoken of than the Molière of the French Comedy."

On Sunday last, the exhibition of the works of the pupils sent home from the School of Rome was opened at the École des Beaux Arts. Of the pictures, it may be said that only the work of M. Chartron deserves credit on the score of merit; his fellow pupils, both painters and sculptors, exhibiting in their work all the peculiar character of modern medalled French art. Of the architectural drawings it is impossible to speak too highly. Never before, probably, have such conscientious studies been sent home from the Villa Medici. Too high praise cannot be accorded to the drawings of M. Nenot, studies from the Temple of Vesta, at Tivoli, and Pompeii; or of M. Blondel's Temple of Vespasian, the details of the decoration of which are of especial merit. M. Paulin's drawing from the altar of Orsanmichele, at Florence,

is a perfect study, as also is his sketch of the famous Hospital of Pistoja,—casts from the decorative terra-cotta ware of the façade of which form one of the features of the quiet and historic *cour des mûriers* of the École des Beaux Arts. The restoration by M. Paulin of the Temple of Theseus, at Athens, deserves more than usual praise for its care and proof of classical research, the coloured metopes and decorations being treated in a truly masterly manner. M. Loviot's "Restoration of the Parthenon" is also another series of drawings which are indeed invaluable, and the professional and archæological world cannot but congratulate the Government on their possession of these works. The whole system of colouring used in the original temple is displayed by M. Loviot in a masterly manner, in all its original splendour, and with an evident truth that scarcely leaves room for doubt. We wish that the Royal Institute of British Architects could induce the French Government to allow these drawings to be exhibited in London, for the benefit and study of those unable to visit Paris. For the student and the archæologist the week's exhibition in Paris barely suffices.

## ARCHITECTURE AT THE SALON OF 1879.

WE had occasion in our last to refer to an able paper contributed by M. Eugène Guillaume to the *Revue des Deux Mondes* on "Architecture at the *Salon* of 1879," and to the promise of the writer to further continue his remarks on this interesting subject. In the current issue of the *Revue* (July 1st) in closing his criticism of the *Salon*, M. Guillaume carries out his promise in a *résumé* of his impressions. As completing the eminent critic's remarks on the present position of architecture in France, we have considered it not uninteresting to lay these remarks before our readers.

In examining the architectural drawings we have referred to the creditable development of archæological study, laying chiefly stress on those meritorious works conspicuous for their special character. Antiquity, the Middle Ages, and the Renaissance are now daily becoming more familiar. The means of investigation are daily multiplied; while not unfrequently different artists explore the same monument, study more closely its forms, to show us, if possible, the building exactly as it formerly existed. The indefatigable labours of these students constantly enrich the domain of archæology and increase our familiarity with the theory of art, while they add in no small degree to our enjoyment of the beautiful.

But what is the practical result of so much learning? The past is being substituted in thought for the present; the facts laid before us by their numbers and importance baffle the imagination, and hinder the liberty of conception by their startling reality. Only a few years since architecture seemed to be running a serious danger; and the period will be marked in the history of art by its architecture, in which the most hybrid elements were brought together, and in which all the styles were hopelessly confounded. In certain countries the geologist points out huge banks of deposited matter, the *débris* of fossils and species still living, which, worn by the waves, and broken and mixed, but still recognisable, form the actual soil of the land. Such was thirty years ago the architecture of France, the result of an ill-digested erudition, shackled by innumerable administrative prescriptions. At the present moment French architecture is freed from all but the recollection of this period, of which it only preserves the valuable mass of documents with which it enriched the profession, and the new liberty accorded to the art has shown itself already in the more varied character of the domestic architecture of the present day.

Painting, sculpture, and architecture, constitute in themselves a society. Turn by turn one of the three sisters exercises over the others a dominant influence, and, as in the history of States, sometimes it is the useful, sometimes the just, sometimes the divine idea which prevails, sometimes the artistic, sometimes the philosophic; and it is the triumph of one of these which gives to society its special character. The same may be observed in the arts; now it is the architectural idea, now the picturesque, now sculpture which takes the authority and rules its sisters. Thus we see in the eleventh, and twelfth, and thirteenth centuries, it is architecture which is queen, the other arts are only subservient to its forms. In the fourteenth century, sculpture breaks down this connexion, and crowds the great public and private edifices with its exuberant luxuriance. In the Renaissance, painting carries the day, disturbs sculpture, and, invading architecture, exacts from it its decorative effects. In the present day it is, in M. Guillaume's opinion, sculpture which takes the upper hand in France; the architect, being more desirous of ornament than of proportion, seeks to increase the value of his work by the aid of the numerous resources at the disposal of the chisel. But the prejudice in favour of painting is so strong, that it may be said to hold the foremost rank in public opinion. In every case it is the most accessible, and even when it has recourse to the study of sculpture it seems to exercise over that art its magic power.

Whatever the faults may be that exist in France, can they be traced to the administrative organisation as it is exercised in that country, or are they the signs of the times? Never, it may be said, have the arts,—which aid each other ceaselessly,—been developed with more independence.

Whatever may be concluded from this fact, the *Salon* does not seem established to allow of truths of such a nature to be stated, since in spite of the number of works exhibited, the means of comparison remain incomplete. The *Salon* cannot be said to be destined to encourage "great art," alone to be produced in great buildings. Such as it is, the *Salon* must be considered as a temporary museum, as a transient gallery in which all the branches of art are, as in the Louvre, welcomed with equal favour. This equality once established, is extended, and the mass of artists consider themselves authorised to claim as a right their place at the Exhibition. Inevitably it must result from this that what is at present only a proposition under discussion will become before long a necessity. For the benefit of the Fine Arts, it will be desirable that at certain intervals shall be held exhibitions of chosen works, in which the Government will exercise its direction, and manifest its elevated views, and protect in matters of art the paramount interests of the State.

It is not our intention to enter with M. Guillaume into his defence of State patronage, but the writer warmly pronounces in favour of the system, citing the superiority of study on the part of France, as shown in the last exhibition of 1878. As M. Guillaume very truly remarks, no effect on French artists seems to have been produced by the great show of the Champ de Mars; and in the *Salon* of this year there is no evidence of the slightest influence of any of the healthy foreign schools which showed so prominently last year in Paris.

It is to this blinding self-satisfaction that may be traced much that is so objectionable in a *Salon* such as each year brings round, with its untiring columns of praise of the painters,—never blame,—from the critics (the *Revue* itself is not free from this fault); an exhibition which propagates its weaknesses by its obligatory award of medals to certain pictures,—pictures that in many cases should be, on the contrary, severely criticised, or at least critically analysed.

Among the architectural drawings at the *Salon* such can scarcely be said to be the case, though the recent exhibition of a large number of sketches for an architectural competition, at the École des Beaux Arts, sadly exposed the paucity of invention on the part of the younger pupils of that famous school. Much as M. Guillaume may claim for modern domestic French architecture its varied character, the Parisian architecture of this Haussmannic epoch, still in active vigour, can scarcely be brought forward as having done more than render the capital a very habitable and strongly-built city, but one which will bear as unmistakably for many a generation its nineteenth-century character, as Nuremberg and many another town of Dürer's country, and the old Italian cities of earlier date, bear the stamp of the beautiful period when they received their still-existing character, which all artists revere so profoundly, and from which they may derive unfailing instruction.

**Sculpture in France.**—M. Ferry has appointed a commission to report on the creation of a museum of comparative sculpture, as an addition to the art resources of France.

## WOOD-WORKING MACHINERY EXHIBITED AT THE KILBURN SHOW.

BY M. POWIS BALE, M.E.

THE Royal Agricultural Society of England, in addition to a magnificent display of live stock, have exhibited at Kilburn one of the finest collections of machinery, connected directly or indirectly with agriculture, ever brought together, and should Mr. Ruskin deign to visit the Show, we are afraid he must admit his Utopian theories are making little progress, and that keen competition, combined with strikes, trade depression, and such like evils, compel machinery ever to play a more and more prominent part in the economy of production. Whilst admitting the great skill brought to bear in the design and construction of the purely agricultural machinery shown, which in many instances is turned out in an excellent manner at a marvellously low price, it is our province at present to consider those machines exhibited which more especially relate to the science of building construction in the conversion of wood and stone. Amongst the exhibits of agricultural houses are to be seen the more or less similar saw-benches that have met our view during the last fifteen years, and although the admittedly superior "box" system of framing has been introduced some eighteen years, the strange conservatism of constructing the framing in sections,—which has little or nothing to recommend it,—is still more or less pursued.

The most extensive exhibit of saw-mill and builders' machinery is that of Messrs. Charles Powis, Carter, & Morris, of London. Amongst the machines in motion was a well-designed single vertical spindle irregular moulding or shaping machine. This tool possesses several features of interest, notably the means employed for reversing the rotation of the spindle, enabling the operator at all times to work with the grain of the wood; in lieu of friction or toothed gear, a strap working from a pulley on the countershaft to an "idler" or "jockey" pulley fixed at the base of the machine is employed. The cutter spindle is so arranged that the "pull" of the driving-belt is supported by the whole frame of the machine, instead of by the caps and bearings of the spindle only, as in some other machines.

A "Joiner Universal" was shown, arranged with four cutters to plane 12 in. by 4 in., and fitted with a self-acting roller feed. The main spindle was divided in the centre, enabling the operations of sawing and planing to be carried on separately or simultaneously. The operation of tenoning is in this machine performed by means of cutters fitted to revolving discs, the wood being cramped vertically and passed between them. The proportion of the framing and general appearance of this machine is good. We also noticed a compact combined engine and mortar mill, fitted to an iron frame, and mounted on wheels; the mill was arranged to be thrown out of gear should the engine be required to drive other machinery. A powerful travelling-crane, trying-up, and other machines were shown, but the appearance of the exhibits was detracted from somewhat by overcrowding.

Messrs. Polyblank, of Newton Abbott, exhibited several of Knowling's patent band-sawing machines, on separate standards and combined with circular-saw benches. The novelty claimed in this machine is in so arranging the mechanical details that when the saw is canted, for cutting at an angle, the table shall travel in a horizontal plane. In most band-sawing machines the table itself is arranged to cant, but in the machine under notice the table remains in a horizontal position, and the main column is mounted at its base on trunnions fitted to the foundation-plate; the table is moved in a horizontal plane, and the column canted simultaneously, by means of a hand-wheel and screw. The working tension of the saw is adjusted by means of a pivoted arm or bracket, which carries the upper saw-wheel. This is acted on by a screw, bedded on a spring support, placed on a fixed rest. Where much bevelled work has to be cut, especially of the heavier class, this machine should be of considerable value, as by retaining the table in a horizontal position the timber is much more easily manipulated. The machines are well proportioned, and the workmanship good, which is a pleasing contrast to some other exhibits.

Messrs. Stark & Co., of Torquay, exhibit several small combination machines, including a hand-power saw-bench, band-saw, and saw-sharpener combined. In the band-saw machine

the tension to the saw is obtained by means of an adjustable elliptic spring, the angle of the saw-table is also capable of being altered whilst in motion by means of a steel spring and catch.

A saw-sharpening machine, of considerable originality of design, was also shown, but the exhibits on this stand were much marred by inferior workmanship.

Messrs. F. W. Reynolds & Co., of London, had a large collection of machines, including a multiple-action hand-power mortising, boring, core-driving, and tenoning machine, in which are several improvements recently patented by Mr. Phillips. These have already been described in the *Builder*.

A combined band and circular-sawing machine is arranged with a counter-shaft attached to the main framing; this arrangement, although having the advantage of compactness, we do not altogether care for, as it necessitates running the belts on the circular-saw spindle at short centres, whereby the friction and consequent wear-and-tear is increased; this is, however, modified as much as possible by adopting the plan of making the fast and loose pulleys on the counter-shaft of varying diameters, so that when not absolutely working the belt runs loose on the smaller pulley, and the constant strain is consequently removed from the belt and bearings. This is a decidedly advantageous arrangement, as it is found in practice that when a belt has reached its maximum stretching point its deterioration is very rapid. Two separate motions are obtained from this counter-shaft, enabling either the band or circular saw to be worked at will. The proportion and arrangement of the main framing are good; also that of the self-acting circular-saw bench exhibited. Several of the smaller tools shown by Messrs. Reynolds & Co. are well adapted to builders' requirements, notably, their patent double slate-holing machine, "Crown," malleable iron flooring-cramp, and self-acting lath-painting machine.

Messrs. Wurr & Lewis, of London, have a varied exhibit, including a compact friction hoist, the gear of which is protected from dirt or accident by being enclosed in one of the end castings of the frame; this is an improvement on the ordinary plan. The friction-pulley is covered some inch thick with leather, which is put on solid. A neat self-acting hand-power cross-cut saw-bench, adapted to the use of packing-case makers, was in work; the table carrying the wood was fitted with a gauge, and mounted on wheels, the self-acting feed being obtained in a simple manner by a counter-balancing weight.

We noticed in some of the band-sawing machines shown, that the adjustment of the tension of the saw was obtained by a combination of both spiral spring and counterweighted lever; the reason for the adoption of this double plan being, we presume, that they should cushion each other if subject to any undue strain. In the self-acting bench shown, the bearings, of which there are three sets, are arranged to let in from the face of the bench, thus making them more accessible for removal or adjustment. A light band-saw machine, to be worked either by a treadle or steam, was amongst the other exhibits.

Mr. Jackson, of Ball's-pond, exhibited a vertical engine and boiler, combined with a clay and mortar mill, mounted on a timber frame set on wheels. It is arranged to drive the mortar-mill, also a saw-bench, band-saw, and hoist, as required; the general arrangement is good, but the whole appeared somewhat cumbersome; this could easily be remedied by employing iron instead of wood in the construction of the carriage. A compact mortar-mixer, fitted with double knives; and a hand-power grinding and mixing mill, were also exhibited by Mr. Jackson.

Messrs. Hall & Co., of London, exhibited one of Bowman's patent double-mitre machines, the cutters, which are arranged in slides, working diagonally at right angles to each other, are operated by means of a lever and two toothed wheels, which are geared into each other and into racks of corresponding pitch, which are fitted to either cutter-slide. These knives are capable of cutting the moulding to a required length, and at the same time mitreing it.

W. Olley & Co., of London, had a number of machines in operation, including a hand-power self-acting sawing and tenoning machine. The wood to be tenoned was fixed vertically in a sliding cramp with a horizontal traverse, and was passed over two circular saws by means of a chain-feed, which was arranged with five rates of speed.

A saw-bench exhibited was fitted with an improved saw-spindle, which is adjustable to any sized hole in the saw. This is secured by a conical collar, which is pressed into the hole of the saw by means of a nut screwed on to the end of the spindle at the back of the conical collar, the larger outside collar being recessed.

Messrs. A. Ransome & Co., of London, exhibited a complete set of machines for making butter-firkins. These are well-designed and constructed, and the firkin is almost entirely made without the aid of manual labour. The wood employed was white poplar, which is first planed and then jointed by four cutters fixed on a revolving conical disc. The staves are then slightly heated and placed in a trussing machine, which consists of a hollow cone-casting made in halves, one half of which opens sideways, the trussing-hoops being placed in grooves recessed in the casting. A platen worked by a lever forces the staves into the truss-hoops. The firkin is chimed and crozed in another machine by means of revolving cutters making some 5,000 revolutions per minute, the firkin at the same time being made to revolve slowly; the length is regulated by an automatic stop-motion. The pieces forming the head are jointed by cutters fitted to a revolving disc, and afterwards bored to receive the dowel-pins by two augers fitted to the same machine. The head is then made circular, and bevelled on its top and bottom sides by means of a concave saw and two flat revolving cutters. The firkin is thus completed.

M. Powis Bale & Co., of London, exhibited a novelty in wood-working machines which attracted much attention. This consisted of a patent hand-power machine for cutting corks and bungs. The corks were shaped by means of a plain steel knife some 2 ft. long, which was fitted on an adjustable slide with a horizontal traverse. The cork is secured between spring centres, and by the action of the horizontal slide working on a camb-lever a rotary motion is imparted to it at the time the steel knife is in operation. The knife is kept constantly sharpened by means of revolving emery-wheels, and is adjusted to cut conical as well as cylindrical corks, the depth of the cut being varied at will by means of a tappet and lever. We were informed a lad can cut with this machine from fifty to seventy gross of corks per day. We also noticed an "Estate Carpenter and Joiner," and a Thompson & Stather's "Patent Grinding and Disintegrating Mill."

Some notes on the stone-working machinery exhibited will follow at an early date.

## CONTINUOUS BRAKES.

THE debate which took place in the House of Commons recently upon the subject of continuous brakes can hardly fail to appear unsatisfactory to the travelling public. Since the successful introduction of a mechanical appliance which places the control of a train within the power of those who are responsible for its safety in a way that never could have been contemplated in the early days of railways, there has been a growing anxiety on the part of the community to see the system generally adopted. The department which is looked upon as the vehicle for giving such sentiments a practical expression is the Board of Trade, but remarks made by Lord Sandon, who is the representative of that department in the House of Commons, and its mouthpiece, were not of a kind that are likely to meet with general approval. It appears, from the experience of those railway companies who have given the subject of continuous brakes their most serious attention, and who have used them most extensively, that so far from their adoption being an uncompensated source of outlay and expense, their use brings about a positive saving in a direction which was formerly very much beyond their control. Among the larger and more provident companies a fund is set apart as an insurance against the too-frequent occurrence of disastrous accidents. In dealing with these, it is generally found that juries are inclined to take a view more favourable to the just claims of the injured and the relatives of the killed than is consistent with the contentions of the railway boards, who have made many efforts to be relieved of all pecuniary responsibility with regard to their passengers. By the use of the block system of signalling and the continuous brake, it is found that the fund referred to is much more available for dividends than formerly, and as the money thus saved amounts in such a railway as the London and North-Western to many thousands every year, it can be readily understood that there is no inherent objection to the use of brakes. The difficulty hitherto has been that a want of uniformity among the different kinds of brakes employed has been a barrier to the introduction of all legislative authority in the adoption and maintenance of the new system, and that the absence of this executive control admits of an amount of misunderstanding and confusion which is proving itself to be seriously detrimental to the safety of the travelling public. Those who can remember the early days of the railways can hardly have forgotten the battle of the gauges, which has ceased as regards the lines of this country, although it is being waged as fiercely as ever in the colonies. The Great Western Railway is almost the only tangible evidence left of what once formed two opposing camps among the engineers of our great trunk lines; but the champions of the rival gauges could hardly have made a greater commotion than is now going on in the battle of the brakes. In the case of inventions which are on the eve of being generally adopted, in response to a widely expressed demand on the part of such a profitable customer as the whole travelling community, it is unreasonable to suppose that the persons at the head of the great concerns which cater for their wants should be no more than mere disinterested spectators. Even though railway directors may be altogether uninterested in the settlement of the question from a pecuniary point of view, there must still be many who are not in this independent position, who nevertheless are able to exercise considerable influence in the formation of the opinions of railway boards, and who will use every effort in their power to bring this influence to bear upon a settlement that is favourable to themselves. Some such elements are, no doubt, one of the many causes which have hitherto been at work, and which account for delays in coming to a decision which are not only irritating to the general public, but must appear to many to be altogether inexcusable. The President of the Board of Trade avoided making any allusion to this very important factor, and contented himself with pointing out the difficulties to which various railway companies were subjected by having identified themselves with certain systems which appeared to others to have a small chance of being ultimately adopted. Little more was done on behalf of the Board of Trade than to join in a general expression of opinion that sufficient time had elapsed to afford railway companies who are really anxious to adopt a system of continuous brakes an opportunity of coming to a decision, and at the same time the expression of a hope that the pressure of public opinion would be found sufficient for the purpose of making them unanimous before very long.

It appears to us that this question of continuous brakes is really in the same category with many other subjects of equal or at least similar importance connected with the introduction of practical mechanical appliances in which the public are generally interested. The block system of signalling, already referred to, is a case in point, and although it is now being almost universally applied, and with results in the saving of life and plant that amply repay the expense, there is no saying how many years would have been wasted, and how many lives have been lost if it had been in the same position as this question of continuous brakes, and been the subject of rival inventions, all equally anxious to push their way to the front. In the face of such difficulties, the public are surely justified in asking if there is no way of surmounting them in a manner that is consistent with the safety of the community and the rights of inventors. Lord Sandon, as president of a department of Government which has a special function in promoting the welfare of particular industries with a due regard to perfect freedom for the introduction of improvements, plainly stated that he never could see his way to making the adoption of a particular system of continuous brakes imperative upon the railway companies, and in this, no doubt, the majority of sensible persons will cordially agree. The question still remains, is there no way out of the difficulty by which the safety of the public, the freedom for the introduction of improvements, and the interests of inventors may be preserved? There may very possibly be several methods of attaining this desirable result, but the one which

appears to be the most simple, and at the same time the most obvious, was not even suggested by any of the speakers in the debate in the House of Commons the other day. It appears to us that since the Board of Trade are now in possession of information which is amply sufficient for its skilled officers to form a judgment as to what the requirements of a continuous brake should be, they ought at once to base these requirements, not upon the average of brakes which have been brought under their notice, but upon the standard of the best. Without even indicating what particular brake is to be adopted, they might still make their requirements so stringent that in practice no other than the best brake could comply with them, at the same time leaving it open to themselves to add to these requirements and regulations so as to embrace new forms and additional improvements that proved themselves to be additional sources of security to the travelling public. In this way, without inflicting any greater hardship upon less successful inventors than is to be found in the every-day struggle for existence, and the survival of the fittest, they would practically reward the inventors of the best appliances, and leave them all the while open to the stimulus of competition.

## WAKEFIELD.

IN one of Dr. Holmes's volumes of "Breakfast-table" chat, the opinion is expressed that there are "provisional races,"—men like the Indians who "exhaled carbonic acid for the use of vegetation, kept down the bears and catamounts," and did other like service for the men who were to succeed them. In like manner there are towns and provisional trade, and one of these, in the writer's opinion, is Wakefield. Its history is not wholly of modern date: it has had distinguished citizens, and has given birth to sons of note; its trade has been large and varied; around it is a fair country, and a wealthy and fruitful one; yet, in spite of these great advantages, its trade seems "provisional,"—that is to say, the trades there do not take the same deep root,—that they change in very considerable degree; and that whilst the town has its tendency to increase, it is not on the lines of the old trades, or in the old directions. The chapel, which was erected four centuries ago; the discovery of coins and Roman relics; the Wachefeld of Domesday; the old church, dating from the time of Henry III., and the battle-grounds near,—all point to the antiquity of Wakefield. Its repute is ancient, even in ballads,—such as that of the outlaw and the "jolly pinder of Wakefield"; whilst some of the old topographers vouch for the extent in the olden times of some of its trades. Leland averred that Wakefield "standeth now al by clothying," whilst in later years malting and corn trades, the iron manufacture, the coal-mines, and other allied industries have taken the place of woollen cloths and yarns. Nor is the trade of the town yet actually defined, though the growth of the coal interests around it are moulding its future to some extent. But to learn how Wakefield has stood the "swellings of Jordan" of change, we must glance at it in the past and in the present.

A little more than twoscore years ago Wakefield was large, opulent, and populous; it was in advance of neighbouring towns, its streets being well paved and lighted with gas, and its water-supply being an efficient one, whilst the newer parts of the town were elegant in appearance. The municipal government of the town was vested in a chief constable, and in commissioners for paving, lighting, and watching. Its position as the chief or central town of the West Riding gave it great advantages. Its two churches were handsome, as were also in a lesser degree the half-dozen places of worship for Dissenters. Its ancient free grammar-school, its preparatory schools, Lancastrian, national, and others, were ample for the needs of its children; whilst almshouses, asylums, libraries, and banks testified to the progressive spirit of many of its inhabitants. Its bankers then were the old firms of Leatham, Tew, & Co., and the Wakefield Banking Company; it manufactured a little cement; dressed and dyed cloth; it had eight scribbling and fulling mills; it spun yarn; had at Cheapside, Westgate, and "Tammy Hall" three stuff manufactories; wool was still largely made and yarn spun, but the manufactories were very small. There was no railway, but the "Harkforward" and eleven other mail coaches partly supplied the need as they dashed from the Strafford's Arms, the Talbot, the Elephant, and other inns. Of carriers, the Deacons, the Wheatcrofts, the Charlesworths, and the Dibbs were noted; whilst the old Halifax contract vessels, the "Fly Boats," to Goole, Hull, and Selby, and the Wakefield contract sloops, did very large duty. The population of the town, which in 1821 was 22,307, had by the end of the following decade risen to 24,538; and it may at once be stated that since that period the growth has been such as to bring it up to 28,069,—so that it is evident that the past rate of increase has not been kept up. One industry has been as yet unnoticed, so that it is needful to add that the coalmasters of rather more than forty years ago were few in number,—the Charlesworths working the Lofthouse Pit; Fentons the Thorne's-lane one; Mr. Field, Place; Messrs. J. & C. Hartley (of Hatfield Colliery), Mr. Rhodes (Haggs's new Colliery), Messrs. J. Smithson & Co. (of Kirkham Colliery), and two others being the whole of those then known.

It is in this industry that the greatest change is noticeable: in the last report of the inspectors of mines, there are forty-six collieries enumerated in the Wakefield district, and four others are given as sinking. Some of those now at work are of large productive capacity, and though Wakefield cannot be said to lie in the centre of the Yorkshire coalfield, yet it is become one of the large centres of production. That increased production of fuel has in the last few years very largely stimulated the trade of the district, and there has been an added impulse given to some of the trades which exist under the old conditions of power-procuration and disposal by water and carrier. The iron trade has not taken the leaps and bounds which the growth of the coal trade not unfrequently causes it to do; but this is from causes due to the natural situation of the district. The old trades of the district,—woollen and worsted,—are still in existence, but it is under different conditions, and some of the older establishments work under disadvantages which do not promise their extension in the future. There has been, however, rather an extension of special branches of trade, such as the manufacture of matting and webbing, of certain kinds of machines, whilst the town holds its old repute for malting and some of the industries which usually gather towards large market towns.

There has been town growth,—the provision of a fuller representation and of a better form of government, with the addition to the institutions of a town which can now scarcely be avoided. But it is doubtful whether there is not a more than equivalent growth of some of the evils incident to such growth. It may be that old towns naturally acquire no small amount of poverty, but that in Wakefield seems large, and there is a not inconsiderable amount of the accidents and offences which call into play the forces of relief and law. It is more pleasant to acknowledge the fact that provision is made for this; that the guardians are increasing the accommodation of the workhouse, and that in the Clayton Hospital and Wakefield Dispensary over 300 patients are often under treatment, whilst there is accommodation beyond this. Its School Board finds as yet much to do in "compelling them to come in," whilst the largeness of the number of the cases at the Petty Sessions proves that there is as yet much to do before Wakefield is pure in life and morals; and that for its increased religious and educational appliances there is much to do. And the disclosures that were made in a recent inquiry as to the "fever dens in Thorne's-lane," the verdict of the jury that typhoid fever was caused by "the foul drain running at the back of the houses," by the drinking impure "water contaminated by the said drain," by the overcrowding of the dwellings, and the insufficient and neglected sanitary provision, point to the need of more vigorous action on the part of the corporation. So far as a fuller water supply is concerned, something is being done; but beyond this much work yet remains for the governing body of the town. Of the future of the town much cannot now be said; its situation on the edge of the great coal-field of Yorkshire, on navigable waters, and in a great manufacturing and thickly-populated district; its old-standing trades and its position as an agricultural and county centre, as well as one of railway confluence, should all give it an impetus which only needs the energy of the people to cause it to result in a growth more rapid in the future than in the past. It is true that it is surrounded by towns energetic and industrious, and to enable it to keep its place in the ranks, equal energy and industry are needed, whilst there should be less dependence upon the "dead past." The visitor to Wakefield, looking down upon its waters, blackened by barges, its smoky mills, its uneven houses and antique streets, the clustering of its ancient cottages, and the disposal amidst gardens and greenery of its newer houses; who hears the talk, loud and babulous, in its streets, and the noisy assertiveness of the red-faced, collarless, dealers,—who at times predominate in station and carriage, and whose converse is of "beeasts" and of "three for 60*l.* and a craahn off,"—those who see Wakefield in its various lights must hope for it a more progressive future, and in which some of the virtues which Goldsmith's famous "Vicar" inculcated may be brought more into prominence.

## A COLLECTION OF REPORTED CASES RELATING TO ARCHITECTS, SURVEYORS AND BUILDERS.*

BY E. S. ROSCOE, BARRISTER-AT-LAW.

*Procedure in case of Inefficient Work by Builder.*

WHEN work has been inefficiently done, or not executed according to the forms of the contract, the person for whom the work is done may either deduct the amount from the contract price, and set up this defence if an action is brought for the whole sum, or he may pay the whole amount and subsequently bring a cross action for non-performance of the contract.—Davis *v.* Hedges, 6 L. R., Q. B., 687; 40 L. J., Q. B., 276 (1871).

[Thus if it is clear, for example, that, in the erection of a house, the work has not been properly done, when the time for payment has arrived the house-owner may set off a proper diminution of the price against a builder's claim. On the other hand, if he has paid the builder, and subsequently finds some defect in the works, the fact of such previous payment does not prevent his claiming damages in respect of the defective work.]

*Payment of Builder.*

When a builder contracts to erect a structure which, when completed, proves to have been so badly executed as to be practically of no use to the employer, the builder is not entitled to any remuneration for his services.—Farnsworth *v.* Garrard, 1 Camp. 38 (1807).

[This was a decision of Lord Ellenborough at Nisi Prius. It is placed, however, in this collection as the principle had, according to Lord Ellenborough, formed the subject of discussion among the judges, so that it is entitled to more attention than ordinary dicta at jury trials.]

WHEN it is stipulated in an agreement between a builder and a house-owner that in certain events penalties shall be due from the builder, to be deducted from the contract price, and a sum in respect of such penalties does become due from the builder, the house-owner may pay the builder the full amount of the contract price, and set off the sum due in respect of the penalties as payment against any claim for extras. — Duckworth *v.* Alison, 1 M. & W., 412 (1836).

*Sums in Nature of Penalties.*

WHEN, in an agreement between a builder and an employer, there is a clause that in certain events (*e.g.* the non-completion of the work by a specified date) the former shall forfeit and pay a certain sum or sums to the latter, such sum or sums are in this nature not penalties, but liquidated damages.—Fletcher *v.* Dyke, 2 Term Rep. 32 (1787); Bonsall *v.* Byrne, 1 Ir. Rep., C. L., 537 (1867).

[Liquidated, that is ascertained damages as distinguished from penalties, which latter are not necessarily the exact sums due in respect of breaches of an agreement.]

*Death of Architect and House-owner.*

THE death of an architect or engineer in the course of his work dissolves his contract with his employer. If he has undertaken to do the work for a certain sum and he dies before com

* See pp. 364, 423, 479, 509, 624, and 651, *ante*.

pleting it his representatives can receive nothing, but if the payment for the work is divisible, then so much as has accrued due at the time of death is recoverable. — Stubbs *v.* Holyhead Railway Company, 2 L. R., Ex., 311; 36 L. J., Ex., 166 (1867).

[As an example of the last part of the above proposition payment at the rate say of 50*l.* per month may be mentioned.]

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Where a building contract has been entered into between a builder and a house-owner, and the latter dies before the contract is fulfilled, the executor or administrator of the house-owner is bound to pay the sums due to the builder, and to allow the contract to be completed, and the executor or administrator of such deceased house-owner can bring an action against the builder if he does not fulfil his contract.—Wentworth *v.* Cock, 10 Ad. & E., 42 1839); Cooper *v.* Jarman, 3 L. R., Eq., 98 1866).

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*Agreements to Erect Houses.*

When there is an agreement by a builder to erect a house, this is a contract which, as a general rule, the courts of equity will not enforce by a decree of specific performance.—Brace *v.* Wehnert, 25 Beav., 348 (1858).

[See observations of Mellish, L. J., in Wilkinson *v.* Clements, 8 L. R., Ch., 96. The general doctrine of equity in connexion with this point is succinctly set out in Watson's "Compendium of Equity," vol. i., p. 93:—"Equity will not in general enforce an agreement to build or repair a house (Paxton *v.* Newton, 2 Sm. & G., 437; Brace *v.* Wehnert (*supra*); Norris *v.* Jackson, 1 J. & H., 319; comp. Mosely *v.* Virgin, 3 Ves., 184; Cubitt *v.* Smith, 10 Jur., N. S., 1123). But if a contract has been in part performed by one party the court will enforce performance in specie, though of an agreement to build by the other party (Price *v.* Corporation of Penzance, 4 Ha., 506); and in a case where A. contracted for the erection of a house on his land and died intestate, it was held that his heir had an equity to have the house built and paid for out of A.'s personal estate (Holt *v.* Holt, 2 Vern., 322; Lechmere *v.* Carlisle, 3 P. W., 222; Cooper *v.* Jarman, 3 L. R., Eq., 98); also where a contract to build or repair, &c., forms part of some other contract, for instance, to grant a lease, of which the court ordinarily grants specific performance, it will specifically execute the latter and grant damages for the non-performance of the former (Middleton *v.* Greenwood, 2 D. J. & S., 142. See Kay *v.* Johnson, 2 H. & M., 118; Mayor and Corporation of London *v.* Southgate, 3 W. N., 297; and comp. Lewers *v.* Earl of Shaftesbury, 2 L. R., Eq., 270)." It may be pointed out, however, that damages for the non-performance of a contract can always be obtained, even though the doctrines of equity prevent the contract from being specifically performed; and the fact that in leases if the covenant to repair is not performed there is always a stated remedy for the lessor, as by taking possession of the property, is the cause of the non-interference of courts of equity in cases of non-repair.]

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Where there is an agreement between a builder and the owner of land that the builder will erect houses on such land, and that the landlord will grant leases of separate portions of such land as soon as the houses have been erected thereon and certain other conditions performed, such agreement is a separable contract, and entitles the builder or the assignee of his interest to require leases to be granted to him of such plots, even though he may not be able to perform the whole agreement.—Wilkinson *v.* Clements, 8 L. R., Ch., 96 (1872).

[The meaning of this important case may be made clearer by an example. Agreement between A, builder, and B, landlord, that A will build houses on estate C, divided into plots, D, E, and F, that A shall be entitled to a lease of plot D as soon as the houses are built thereon and finished ready for occupation. A becomes bankrupt, having mortgaged his interest in plot D, on which the houses are finished, to G, and is unable to complete the contract, G is entitled to have a lease of D granted to him.]

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**Cement for Coating Acid Troughs.**—Melt together one part pitch, one part resin, and one part plaster of Paris (perfectly dry).—*Electrician.*

## AN INDIA-RUBBER MANUFACTORY.

At Ivry, on the banks of the Seine, about two miles distant from Paris, is situated the great Guibal India-rubber Manufactory, renowned throughout Europe. There is, almost at the very doors of the establishment, a quay, at which coals are delivered for its use, and whence its productions are transported to every quarter of the world. The building itself consists of three floors, enclosing an enormous square space, shut off from the public thoroughfare by a grating of penal aspect, and separated from the river by a spacious court-yard. All over this are scattered small constructions which, if not carefully divided from one another, might, at any moment, through any accident, produce a general conflagration. Here are the stores of spirits, the distilling-shops, the lamp-houses, the "preparatory magazines," and the prodigious accumulations of coal necessary to keep up the furnaces at full heat, by night and by day, and the steam machinery in rapid action as well. Now, India-rubber, as it is called, has entered so largely among the industries and inventions of modern times, that there is scarcely a limit to its practical application, from the buffer of a railway terminus to the pad of a rifle cartridge. Still, the material remains dear in the market, as, in Paris, at the three famous establishments, with one at Montargis, and another at Clermont, where the most singular chemical and mechanical processes are incessantly going on together, to the utter bewilderment of uninitiated strangers, who are at a loss to distinguish between the fabrication of a pump, and that of a pair of shoes. But the manufacture retains its unique importance, nevertheless. Its raw material is obtainable nowhere else than in the New World, where alone this elastic gum is produced, but where its countless uses, in domestic economy, are scarcely known. Of course many treatises upon its properties and applications have been written and published; but these are beyond our purpose, just now, and not less so are the experiments aiming at the cultivation of caoutchouc trees and plants in Algeria, Corsica, and the Southern Provinces of France. These have all failed, and there is not the slightest chance that they ever will succeed. It is a remarkable fact, and one well worth understanding, that, after all, London remains the great and central india-rubber market of the world, notwithstanding the boasted acclimatisation of the elastic gum-plant in France. This acclimatisation, however, has hitherto only reached the stage of experiment. The workers are few, and the harvest is small. The Indians of the Amazon Valley are still our superiors in this respect, as they have been for the last 130 years, a date at which their torches were of this material, and who set us the example of employing it in various forms. They moulded it into the shapes of fruits, birds, four-footed animals, ornaments, playing-balls for children, the human figure, architectural models, and shoes, warranted, as it seems curious to think, not to let in water. The early French travellers perplexed themselves a good deal over this discovery: they found out a method of dissolving the substance in ether, but could not take advantage of their knowledge; and all they could do was to make pipes and funnels of this useful gum.

Meanwhile, in England, it had been recognised as of utility in effacing pencil-scratches,—a trick, indeed, which the illustrious navigator, Magalhaens,—vulgarly known as Magellan,—spoke of as a substitute for the British custom of using for the same purpose dried bread-crumbs. But its employment rapidly extended: it was adopted as an auxiliary material in carriage-springs, for elastic ligatures, for tubes and garden apparatus, for waterproofs, for submarine cable-coverings, for hermetic envelopes of every kind; in fact, it became a kind of almost universal manufacture, though the original "Macintosh" was, of course, not simple india-rubber, but a chemical compound. The French, however, rapidly improved upon these English novelties. They began with garters and staylaces, and rapidly went on to the employment of india-rubber in the fine-arts, or, at any rate, in decorations of rooms, picture-frames, and furniture. It was upon this foundation that was built the vast establishment of the Messieurs Rattier & Guibal, who import the material *en poire;* who put it through every process essential to a manufacture which assumes at this day a thousand forms, and whose imports of the raw, and exports of the manufactured, substance reach in value to upwards of a million sterling a year. They bought their secrets, it is true, in the first place from an American named Goodyear, and in the next, from the Englishman Hancock; but they seized upon these ideas; they substituted the new material in place of whalebone, they vulcanised it, made it hard enough to withstand the blow of a steam-hammer, liquified it, submitted it to every kind of scientific torture, and, at last, converted it into billiard-balls, as they have done at Ivry, with the cushions of billiard-tables into the bargain. Since the process of vulcanisation was invented, neither M. Fritz Solier nor M. Guibal professes that any important discovery has been made in the manipulation and employment of this material. They had hoped, as we have suggested, that it might supplant whalebone, horn, tortoise-shell, steel for pens, and even steel-plates for the armouring of ships of war, as being lighter, and not less invulnerable; but these expectations have not been answered by the event. The composite called, in trade, ebonite, has, it is true, been adapted to a variety of purposes. Exposed to an extreme degree of heat, and subjected to an immensity of pressure, it comes out of a beautiful black, susceptible of a brilliant polish, capable of being struck and stamped into medallions, wrought into chains, and sculptured into decorations for staircases and roofs. The modern employment of this material in electrical machines and printing apparatus is familiar to all, but less so is its value, except as for machinery bands, as an agent in the ornamentation of the small modern mansions with which the suburbs of Paris now superabundantly abound, and which keep the factory we speak of at a perpetual state of high pressure. The processes here would be bewildering, except to an eye accustomed to the whirls, reelings, unreelings, incessant action and counter-action, clippings, and eccentricities of machinery movement, and so forth, that keep the whole apparatus in action. There is, in the first place, the sulphur-mixing room; then the great gallery in which the "paste" is worked to a regular consistency; next, the "shop" wherein the girls perform their special task of smoothing and flattening the sheets prepared for cutting and stitching into endless bands; now the colouring, then the stamping; and all these movements of the manufacture require, so to speak, a great tenderness of manipulation in detail. Sometimes a fabric, almost perfectly white, is required, or one of amber, or one of the natural dark, dead grey, belonging to India-rubber generally; and all these methods involve, at Ivry, a large amount of machinery work, premises warmed and ventilated with particular science and care; and a series of baths, in lamp-black and white-lead, which, the statisticians assure us, are exceedingly injurious to the persons employed. It is a well-known fact that any mirror or looking-glass placed in one of these factories becomes immediately useless; while, so powerful is the chemical action going on, that, without the utmost precautions, the tapestries of this material would cling together and be irremovable, except as a mass of rags. The manufacturers say that they experience considerable difficulty of this kind in the production of fire-hose and garden-tubing, in any extraordinary lengths; but they must have overcome many such obstacles, if we look at the catalogue placed upon the desks in their counting-houses of the necessaries which they are prepared to supply,—gas and water pipes in every possible variety; pump fittings, soft linings for wheels, and, not to continue an enumeration that would extend to the length of an auctioneer's catalogue, seventy-sixty other essentials, supplied from the great Indiarubber firm at Ivry. The modern development of this industry, of course, is one of a comparatively few years' growth; but it is attaining an importance which not even the proprietors at Ivry originally foresaw.

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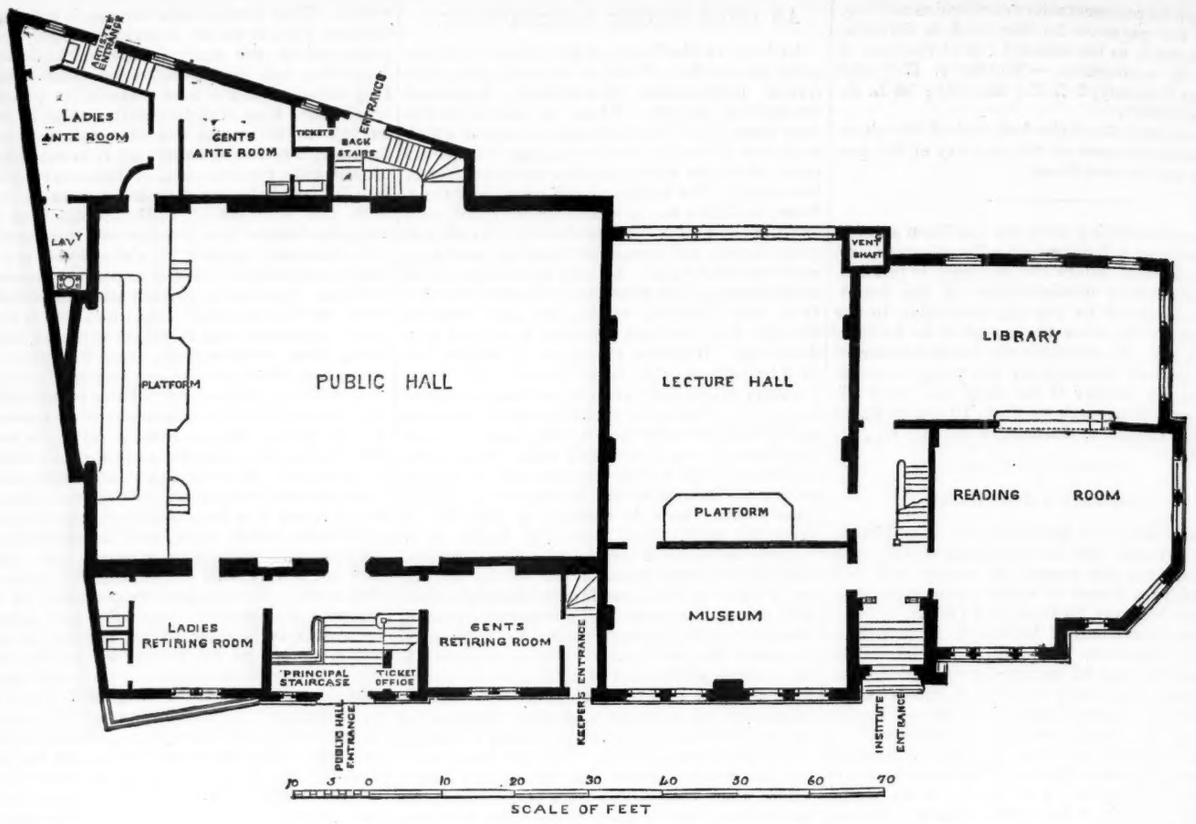
**St. Alban's Abbey.**—On Saturday last the St. Paul's Ecclesiological Society visited St. Alban's Abbey, when Mr. G. Gilbert Scott gave a short account of the early history of the city of Verulam, and of the more modern city by which it was succeeded; of the martyrdom of St. Alban and his friend, St. Amphibalus; and recounted the architectural history of the Abbey and of the buildings which preceded it. He also described the works now proceeding in the nave, and especially the means by which the walls of the nave had been restored to the perpendicular.




STEPHENSON MEMORIAL HALL.—*Plan of Ground Floor.*

## NEW BANKING PREMISES, LUDGATE-HILL.

NEW bank buildings, which have just been erected in Ludgate-hill, for the City and Counties Banking Company (late the Hampshire Bank), have been opened for business. The new bank is situated on the south side of Ludgate-hill, at the entrance to Ludgate-square, and forms one of the first of the new buildings for the widening of this end of the thoroughfare, being set back about 17 ft. from the present line of frontage. The structure is lofty, being upwards of 60 ft. in height, and consists of four stories, in addition to the basement and ground-floor. The lower portion of the elevation is carried up with pilasters in Crosshill stone, resting on massive iron bases. The pilasters are surmounted by capitals, in Portland stone. The upper part of the elevation is of Bath stone. Each floor has a range of three windows, between which are moulded panels.

Internally the building is very strong and substantial, more especially the basement, which contains the strong-rooms and safes. The ceilings of these are 16 in. in thickness. They contain rolled iron joists, with cement concrete interlaced with iron hoop, upon which rest two courses of brick, also interlaced with hoop iron, the whole being covered over with concrete, 4 in. in thickness. The safes are fitted with massive iron doors, furnished by Milner's Safe Manufacturing Company. The ground-floor portion of the building contains the banking-house, an apartment 40 ft. in depth from the Ludgate-hill frontage to the rear. Some portions of the upper parts of the building are intended to be occupied in connexion with the business of the bank, whilst the rest will be let as offices.

The architect is Mr. B. Tabberer, of Coleman-street, City, and the contractor Mr. Mark, of Bell-square.

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**Thurton.**—Thurton Church, Norfolk, is about to undergo thorough restoration. Sir Reginald Proctor Beauchamp, bart., repairs the chancel at his own expense. The architect concerned is Mr. Herbert Green, of Norwich.

## THE STEPHENSON MEMORIAL HALL, CHESTERFIELD.

THE Duke of Devonshire has consented to open the Stephenson Memorial Hall, at Chesterfield, on Monday, July 14th. The building, the foundation-stone of which was laid by the Marquis of Hartington, on October 17th, 1877, is situated in Corporation-street, near the railway station, and is in sight of Tapton House, where George Stephenson died. Its cost will be something over 12,000*l*. It has been erected from the designs of Messrs. Smith & Woodhouse, architects, of Manchester.

In its arrangement the building may be divided into two parts, one portion comprising a public hall, the other being devoted to educational purposes. We give a view, and the plan of the ground-floor. The public hall portion consists of a large hall, front and back staircases, gentlemen's and ladies' retiring or cloak rooms, and artistes' ante-room. The large hall measures 68 ft. in length, 46 ft. 6 in. in width, and is 40 ft. high to the ceiling, chairs being provided for 500. The gallery, which runs round three sides, supported on cast-iron brackets, and having a pitch-pine front, has permanent seats for 350. The platform, which extends the full width of the room, will seat eighty performers. Light is admitted through eleven mullioned windows filled in with coloured glass of geometric design, night-lighting being effected by six large gas coronæ suspended from the ceiling, and having 144 lights in all; twelve short pendants, having thirty-six lights, under the gallery; and two brackets, with five lights each, at the back of the platform. A store-room is placed convenient to the hall, so that when required the hall may be cleared of seats.

The whole of the exposed woodwork, except roof-timbers, is of pitch-pine, stained and varnished. The walls are plastered throughout, no decoration being attempted other than plain tints in distemper.

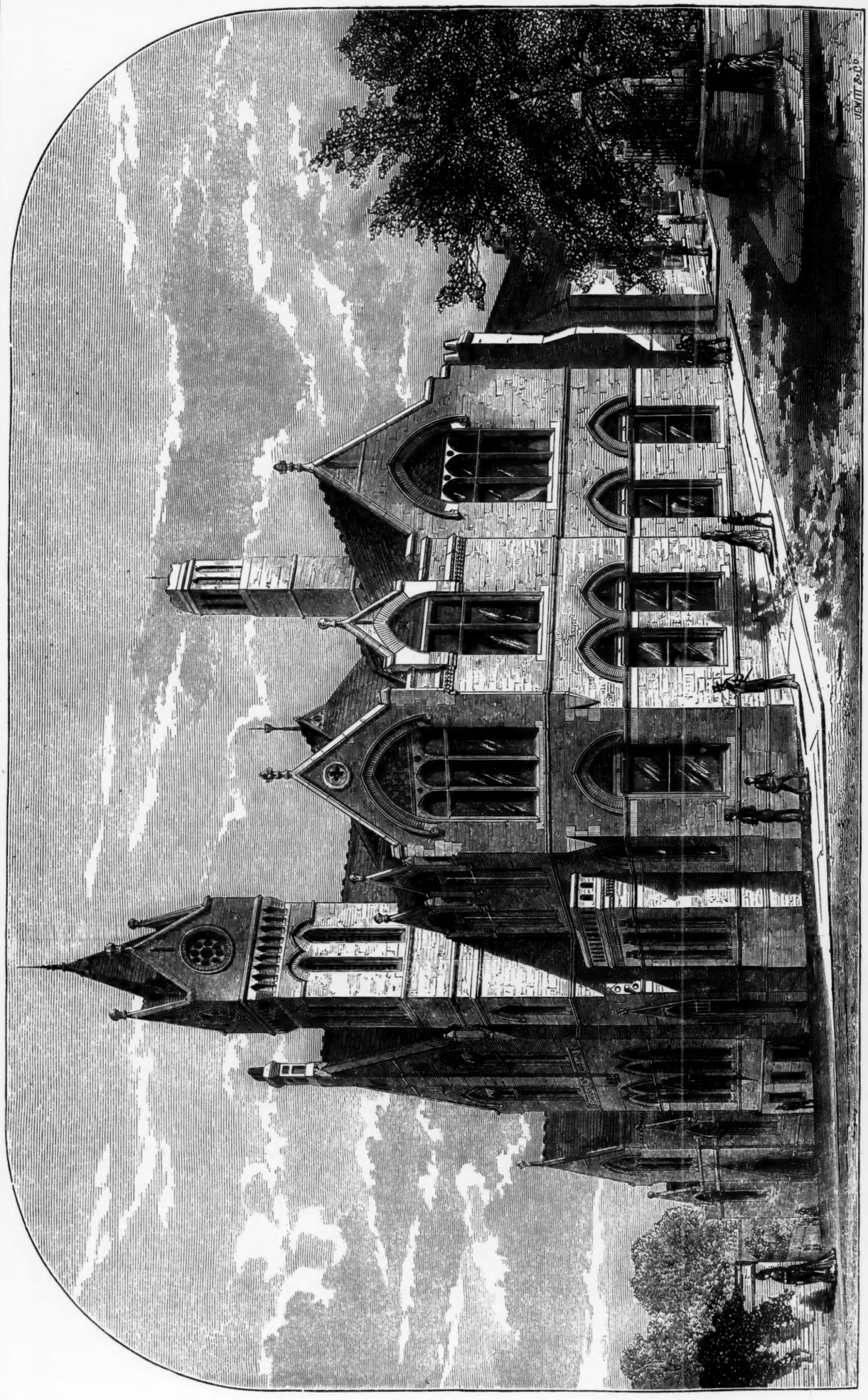
The Institute, or educational portion, the entrance to which is from Corporation-street, contains the following rooms:—On the ground-floor, reading-room, 33 ft. 6 in. long, 25 ft. 3 in. wide; library, 42 ft. long, 21 ft. wide; museum, 32 ft. 6 in. long, 19 ft. wide; and lecture-hall, 40 ft. 6 in. long, and 32 ft. 6 in. wide. On the upper floor, which is reached by a stone staircase, are an elementary art-room, 61 ft. long, 32 ft. 6 in. wide; advanced-art room, 33 ft. 6 in. long, 25 ft. 3 in. wide; laboratory, 42 ft. long, 21 ft. wide; store-room, 9 ft. square; a ladies' cloak-room being placed over the library. In the basement, under the museum and lecture-hall, are the keeper's-rooms, store-cellar, serving-room, and heating-chamber.

With the exception of the keeper's-rooms, which are provided with open fire-places, the whole of the building is warmed by means of hot water on the low-pressure system; the wrought-iron saddle boilers, of which there are two, being in the basement, and the cold supply-cistern in the tower. The work has been successfully carried out by Messrs. Oliver & Co., of Chesterfield, from plans and instructions prepared by Mr. J. W. Fern, of the same town.

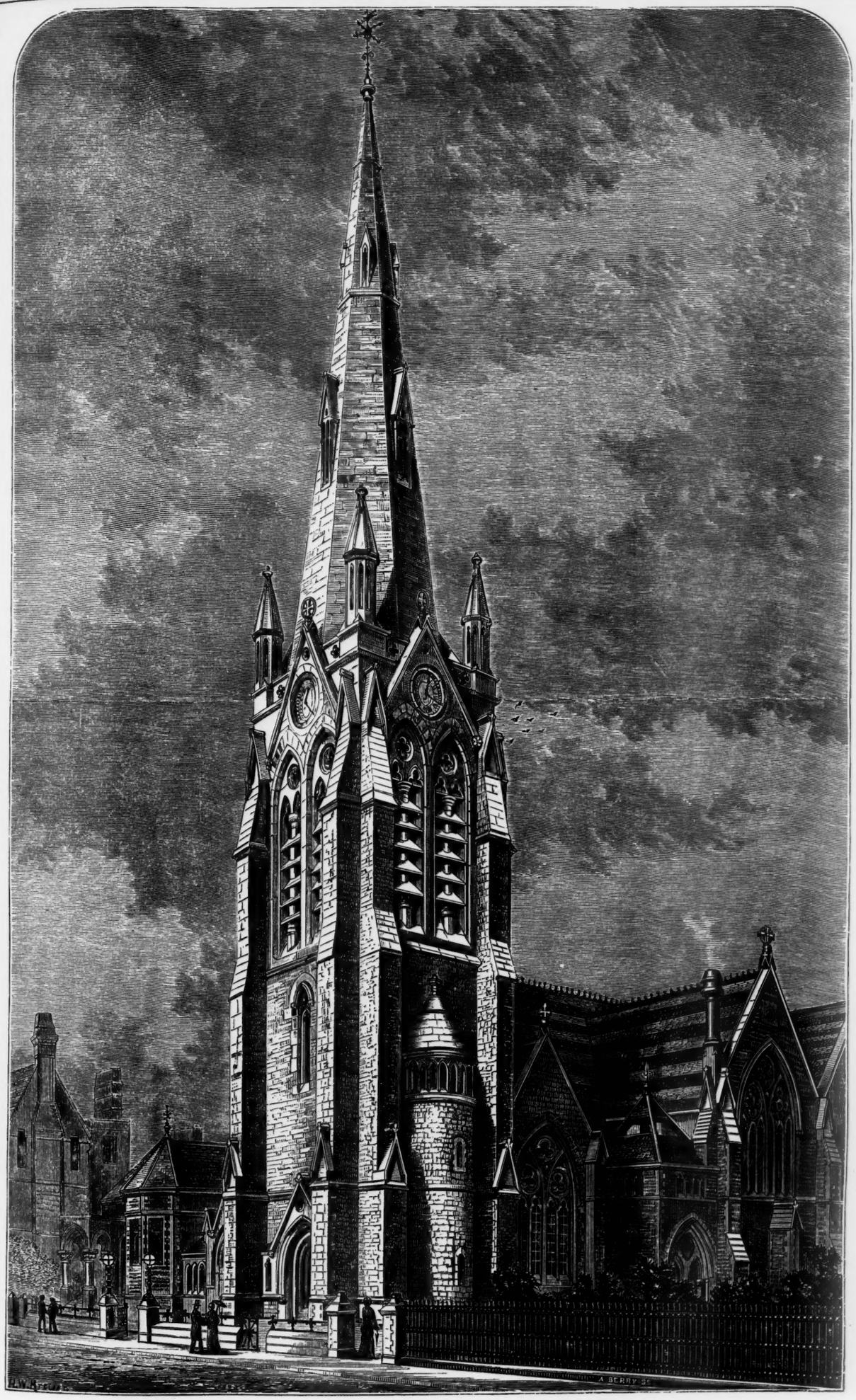
The ventilation, to which much attention has been given, is effected by means of lath-and-plaster tubes above the ceilings, along which the impure air is drawn to the large ventilating shaft, by means of a current induced by the heat from the boiler fires, which passes along with the smoke up the same shaft. A small furnace is provided for summer use, when the heating-apparatus is not required. The fresh air is admitted through vertical tubes, and thus caused to take an upward course, thereby preventing draughts.

The style of architecture is Gothic of simple detail, advantage being taken of the irregular shape of the site and the varying levels of the streets to produce a varied and picturesque outline. It is faced with red bricks, relieved with stone dressings from the quarries of Sir Joseph Whitworth at Darley Dale; the roofs are covered with Welsh blue slates, capped with ornamental red ridge tiles.

Messrs. Chadwick & Co., Masborough, are the general contractors; Messrs. Edmondson & Son, of Manchester, supplying the ornamental glass; Messrs. J. & H. Patteson, of Manchester, the marble, concrete flooring, and wall tiles; and Messrs. Ogden & Co., of Manchester, the gas pendants. The whole of the works have been carried out under the supervision of Mr. E. G. Mawbey.



STEPHENSON MEMORIAL HALL, CHESTERFIELD.—MESSRS. SMITH & WOODHOUSE, ARCHITECTS.



ST. JUDE'S CHURCH, SOUTH KENSINGTON.—MR. HENRY GODWIN, ARCHITECT.

## ST. JUDE'S, SOUTH KENSINGTON.

### THE NEW TOWER AND SPIRE.

IN our volume for 1870 we gave a view of the design for St. Jude's, as it was proposed to be erected, taken from the north-west angle. The present view is from the south-west, and shows how the church has been completed. The erection of the tower and spire was deferred for some time after the church had been built.* A number of gentlemen, however, frequenters of the church, forming themselves into a committee, in a very short time obtained the funds for completing the works. The vicar (Dr. R. W. Forrest), the Right Hon. Acton S. Ayrton, Major the Hon. C. Keith-Falconer, Lord Justice Thesiger, Mr. Herbert C. Saunders, and Mr. Robert Rawlinson, C.B., were amongst those on the committee; the Rev. W. Smale acting as hon. secretary, and Mr. J. Green as treasurer.

The tower is 21 ft. square exclusive of buttresses, and is used as an entrance to the church. This additional means of exit was much needed, consequent upon the large congregation the much-esteemed and accomplished vicar has drawn around him.

The church is arranged for 1,600 sitters, but constantly accommodation has to be provided by chairs placed in the passages for many more.

The height of the tower and spire is 155 ft. from the ground, exclusive of the vane. They are built of Kentish rag and Box-ground stone. Internally, the walls are lined with malms, and some slight ornamentation of coloured bricks is introduced. The ceiling is of bold timbers, chamfered, supported by pierced brackets springing from carved stone corbels. The timbers are stained and varnished. The flooring is of a very good design, by the architect, formed with 4-in. tiles of red, black, yellow, and white.

The tenders for the work ranged from 4,786*l.* to 3,625*l.*, the lowest being that of Messrs. Adamson, of Putney and Turnham-green, who have carried out the work in a very satisfactory manner. The total cost was 3,876*l.*, some work being added in the shape of pinnacles at the foot of the spire, and other matters. The vane, which is of copper, was supplied by Messrs. Hart, Peard, & Co., of Wych-street. A clock has just been set up in the tower by Messrs. Thwaites & Reed, and Messrs. Warner, of Jewin-crescent, supplied the bell. The architect was Mr. Henry Godwin, of Alexander-square, Brompton.†

When this church was first built it stood by itself in the midst of garden ground, and in our notice of it we wrote:—"A fine neighbourhood will doubtless soon spring up around the new church," and certainly our prediction has been verified, for more than 200 houses have been erected immediately around the church on the land belonging to the origioal freeholder of its site, Col. Gunter, of Wetherby Grange, Yorkshire, and on that of his brother, Col. James Gunter, let at rentals ranging from 150*l.* to 700*l.* per annum each. Some very fine and exceptionally well-built houses have been erected by Mr. Wm. Radford, immediately facing and on the southern side of the church. Messrs. Pargeter, Wm. Jackson, and others have also built some good houses on these estates.

On the contiguous land belonging to Lord Kensington and Mr. H. B. Alexander respectively, the growth of the neighbourhood has been equally extraordinary, many large and well-built houses having been erected by Mr. W. H. Cullingford and other well-known builders.

The operations in this one small district illustrate the extent to which accumulations of property in England are going on. Taking the number of houses built around this church since its erection at 400, which is under the mark, and their average value as at least 3,000*l.* each, they represent roundly, it will be seen, a million and a quarter of money.

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**The Cochin and Travancore Railway.**—The engineer-in-chief of this line, Mr. H. W. Hudson (formerly of the Great Northern Railway) is engaged in getting up the surveys, estimates, and statistics connected therewith. The Cochin and Travancore Governments have promised to subscribe capital to the amount of 70,000*l.*

* A full description of the building, which has special features, was given in the vol. for 1870, pp. 547 and 1042, and an interior view with plan in the vol. for 1871, page 367.

† The drawing enraved is from a photograp h produced by Messrs. Bedford Lemere & Co., of the Strand.

## PAUL'S CROSS.

"PAUL'S CROSS," the late Dean Millman tells us in his History, "is historically part, and an important part, of the cathedral. As preaching grew more popular, and began more and more to influence the public mind, the cross became the pulpit, not only of the cathedral, but almost of the Church of England." On this account alone, and within a few weeks after the discovery of its foundation site, we purpose to tell our readers something of its history and of the many remarkable events with which its name is associated; although, to go back and repeat all the incidents connected with its existence would very well fill a large volume. Brief as they may be, our notes will be found interesting, if not exhaustive; and such as they are, will be found to give some curious matters, in which the doings of our "good old times" stand most conspicuously forward.

But the actual date of the foundation of Paul's Cross appears to be unknown. Dugdale, curiously enough, gives only a very brief account of the famous pulpit; and had it not been for Sir Henry Ellis incorporating some valuable references in his edition of the "History of St. Paul's," no reader of the original work would suppose the history attached to the cross to be more than that of an ordinary churchyard cross. "That the original occasion of erecting a cross here, and so likewise in all other churchyards, was to put good people passing through such cemeteries in mind to pray for the souls of those whose bodies lay there interred, I am induced to believe, from what an authentic historian (Ingulphus) telleth us, viz., that Godrick, the venerable Abbot of Peterborough, having taken care for the burial of those monks of that monastery which were barbarously murdered by the Danes in that fatal irruption made by them into this nation, anno 870, erected a cross of stone in the same churchyard where they had sepulchre."

The earliest recorded date, however, of the pulpit,—if a pulpit then,—having been made the place of meeting for the citizens of London is the year 1257,—more than 600 years ago. Fabyan, one of our earliest chroniclers, speaks of a very mysterious occurrence,—the finding "in the kynge's warderobe at Wyndesore a bylle or rolle closyed in grene waxe, and not known from whence it shuld comme." Of course, in those times this was a very wonderful find, and a very plausible excuse, seeing that the precious document made grievous charges against the Mayor and Aldermen of London, about which the king (the third Henry) very readily took it into his head to inquire. "He anone sent John Mancell, one of his justycys, into London, and there in ye feest of ye conversyon of Seynt Paule, by the kynge's autoryte, *callyd at Pawlys Cross* a folkmote"; that is to say, a meeting of the citizens, and at which, after no ordinary excitement and more than one meeting, and during which it was a question which side would be victorious, "was rehersyd a fayre and a plessant tale, promysyng to theym that theyr lybertyes should be hoolye and invyolatlye preservyd by the kynge, with many other thinges to the greate comforte of the comon people."

This "little" event, which in reality was a very momentous affair to the citizens, and was only one of the troubles they had to endure in the good old times when the sovereign was always trying to plunder them, was quickly followed by others. Thus, only three years later, Henry "comaunded a folkmoot to be callyd at Pawlys Crosse where he in propere person, with the King of Almayne, the Archbysshop of Canterbury, and many other nobles came where the Kyng commaunded unto the mayre that euerye strypelynge of the age of xij yeres and above shuld before his aldreman be sworne the day folowinge to be trewe to the kynge and to his heyres kynges of Englande, and that the gates of the Cytie were kept with armyd men." And, as if this was not sufficient to command obedience from his subjects, the king, on the second Sunday in Lent, in his forty-fifth year, 1262, "comaunded to be red at Pawlys Crosse a bull of the graunte of Pope Urban the iiij of that name as a confyrmation of another bull before purchasyd of his predecessor Alexander the iiij," which was nothing more nor less than the superstitious absolution for him breaking the oath he made to maintain the articles of the "mad Parliament" at Oxford, but with this decisive ultimatum, that any one refusing to acknowledge the justice of this absolution would, without ceremony, be imprisoned. It is thus that Paul's Cross sprang into notoriety, and thus it continued, as we shall see, to the end, as being the most convenient spot for the citizens to meet at. But in order that our readers shall understand that the actual position of the structure was the same as that of which the foundation has been lately found, the old City historian, Stow, says, "about the midst of this churchyard is a pulpit cross of timber *mounted upon steps of stone*, and covered with lead, in which are sermons preached by learned divines every Sunday in the forenoon"; and Dugdale adds,—"standing in the Churchyard *on the north side towards the east end*." And this is confirmed by a quotation by Sir Harris Nicolas from the will of Sir Otho Grandison in 1358, who left, among other legacies, one *to the Cross at the north door of St. Paul's*. The actual site was, by tradition, supposed to be where a fine elm tree once grew, but which died some forty years ago; and it is a satisfaction to know that in this instance tradition was right, for at that place the remains of Paul's Cross have been found.

History does not record another event until 1299, but then that is a pretty good sample of the times. Certain persons went digging for a supposed treasure buried in the church of St. Martin's-le-Grand,—the site of the General Post-office, — "for the whiche dede," says Fabyan, "the deane of Paules, the seconde Sunday of Lent followynge, denounced all theym acursed that were at that dede doinge or consentynge to the same." To be cursed at Paul's Cross in the days of Edward I. was by no means a pleasant business; it was next to, even if not worse than, killing the individual outright. So this simple paragraph does not tell the actual weight of the punishment inflicted.

Our readers may not be aware that the Cathedral and Cross were both identified with what we now call pawnbroking, so long ago as 1361. Dugdale narrates that the good Bishop Northburgh, among other charities, left 1,000 marks, which were to be placed in the cathedral chest, out of which any poor layman might borrow *without interest*, a certain sum upon pledges, which, if not redeemed *at the end of a year*, were to be cried at Paul's Cross by the preacher in his sermon, and if not then bought in within fourteen days, they were to be sold and the profits (above the sum lent) were to be either handed over to the owner or relations, or if none could be found then to go into the chest fund "for the health of his soul," and, as it may be very truly said, a really good purpose in those days, however much abused the system may be in ours.

A few years later, in 1378, or just five centuries ago, a riot took place in West Cheap (now Cheapside) during the time the Bishop of Carlisle was preaching at the cross, and it must have been a serious affair, seeing that one of the sheriffs was, for a time, disgraced for his connexion in the matter. Four years later, we are told, a great tempest tumbled the cross to the ground,—at least, so said Dean Nowell in 1561; but Malcolm very justly remarks that such a tempest as described would also have destroyed half London, but about which we hear nothing. It is possible, however, that some casualty did upset the building, for it is recorded money was appealed for, some years later, to rebuild it with, and that even Bishop Courtney made use of the cash for his own purposes, but whether this is only slander Dean Nowell himself alone probably knew. That it was getting ruinous is very possible, and that it was rebuilt some years later on is a fact.

Of the year 1388, Fox, the martyrologist, in his "Acts and Monuments," gives a very curious note,—a copy of the earliest sermon known, and that preached on Quinquagesima Sunday at Paul's Cross. It was, says he, "a goodlye and famous sermon" by Preacher Wimbeldon, and seems to have created some stir. The same author tells us that six years before this two doctors in divinity were excommunicated at the cross for "hereticical preaching vehemently suspected." To suspect a man at that date was to punish, without much trouble about judge or jury. A few years further on, on Easter-day, 1417, the two wives of Lord Strange and Sir John Tussell, knight, had a dispute during a sermon at St. Dunstan's-in-the-East. Ladies' battles, we suppose, were quite as hot then as now; at all events, their husbands got mixed up in it, and, as a result, suffered. There was much blood spilt before they were

taken to prison, and then the Archbishop caused them to be excommunicated at Paul's Cross and in all the other City churches. That was bad enough one would suppose, but the law *then* was strict, and culprits were made to *feel* for their misdeeds. On the 1st of May, before the prelate, the Lord Mayor, and the citizens,—in fact, it was without doubt a great holiday,—my Lord Strange and his wife did penance. "All their servants should *in their shirts* goe before the parson of Saint Dunstan's from Paul's to Saint Dunstan's, and the lord *bareheaded* with his ladie *barefooted*, Reignold Kenwold, archdeacon of London, following them, and at the hallowing of the church the ladie should fille all the vessells with water and also offer an ornament of ten pound, and the Lord Strange should offer a pire of five pound." What a crush there would be to see a similar sight now! And yet the popular fury was not appeased when lords and ladies were brought to the cross; for in 1458 Bishop Peacock, of Chichester, was himself denounced as a heretic here, and the books he laboured so much upon were burnt before his eyes, although he volunteered a recantation.

Thomas Kempe, the Bishop of London, who died in 1489, was the rebuilder of the cross which stood in Stow's time, Dugdale adding, "as his arms in sundry places of its leaded cover do manifest." Whether it was the old or the new building at which the Bishop of Exeter in 1461 "proved" the title of Edward IV. to the throne we know not, although the date of the rebuilding is set down as five years earlier. Anyhow, it was probably at the new cross that the ill-fated Jane Shore, the heroine of many a questionable biography, suffered for her sins in 1483; for, as Fabyan tells us, "thaine began the longe covert dissymulacon whiche the Lorde Protector had bene so craftly shadowyd to brake out at large"; for at the cross, he with Buckingham and the other lords, by the aid of the preacher, Ralph Shaw, "shewyd openly that the childrene of Kynge Edward the iiij were not legitimate," and following up this shameful attack, he in the following May had poor Jane Shore accused of witchcraft and everything else that was bad. As her history is, unfortunately, a popular one, the following description of what our early chronicler, Hollinshed, thought of the penance she was made to suffer may be of passing interest:—"Goinge before a crosse on Sondaye at procession with a taper in her hande, n the whiche she went in countenance and pace so womanly, and albeit *she was out of al her araye savynge her kyrtell onlye*, yet went she so fayre and lovely, namelye, when the wondryng of the people cast a comelye rud in her chekes (of the whiche she before had most misse) that her great shame wonne her much prayse amongst them that were most amorous of her bodye than anxyous of her soule, and many good folke that hated her lyving, and wer glad to see synne corrected, yet petied they more her penance than reioyced therein when they considered y^t the Protector dyd it more of a corrupt mynde than eny vertuous effection." Whether this penance was done by her walking through the streets of London, or standing at Paul's Cross, is not quite clear, but possibly she was made to do both. But such sights then were not uncommon; for some fifteen years later (16th and 23rd July, 1498), on two Sundays Londoners had the satisfaction of seeing no less than a dozen heretics stand at the cross with faggots around them, to remind them in grimness most horrible of the fate they might expect if they mended not their ways.

This brings us to the sixteenth century, and for the next century and a half Paul's Cross was in the height of its popularity. It is impossible to chronicle all the events, but our selection shall be as good an illustration of the times as it is possible to find. From here, in 1502, was publicly announced the marriage contract between James IV. of Scotland and the daughter of Henry VII., when twelve bonfires were set blazing in the streets, and twelve hogsheads of Gascoigne wine given to the populace "to be drunken of all men freelie." The public in the nineteenth century are satisfied with a sight of Royalty (when they get the chance) without having the pleasure of having anything given to drink their health with. And the same year Fabyan tells us "upon the first Sunday of Lent was solemnly accursed at Paul's Cross, Sir Edmund de la Pole, Sir Robert Curzon, and others, and all that them aided again the king."

It was in 1520 that Erasmus and his writings were condemned in "a ridiculous sermon" by a Paul's cross preacher, and the next year was the penance of one Adrian Dolevyn, who, for publishing heretical opinions, was ordered to bear a faggot, and walk bareheaded, barefooted, and barelegged, from Blackfriars to St. Paul's, and stand before the preacher at the cross during the sermon. But one of the imposing ceremonious businesses took place on the 12th of May, 1521, when, according to a Cottonian MS., Cardinal Wolsey, attended by all the court and clergy, came to St. Paul's, four doctors bearing a canopy of cloth of gold over him; and after he had made oblation before the altar, took his seat on a prepared throne by the cross, around which stood all the chief personages of the realm. "And then the Bishop of Rochester [Fisher] made a sermon by the consent of the whole clergy of England, by commandment of the Pope, against *one Martin Eleutherius* [Luther] and all his works, because he erred sore and spoke against the Holy Faith; and denounced them accursed which kept any of his books. And there were many burned in the churchyard of his said books during the sermon, which ended, my Lord Cardinal went home to dinner with all the other prelates." But do what they could, it was useless to expect to crush Luther. The Grey Friars' Chronicle tells us that in 1527 Barnes, the Prior of St. Augustine's, Cambridge, with four others, ordered to stand at the cross with faggots and tapers about them, were placed on a high scaffold within the church "because of rayne," not, as we think, for any merciful consideration, but because few persons would have taken the trouble to stand in the rain to look at them; and Bishop Fisher having discoursed, Barnes was taken back to prison. "But," says our record, "he broke away from them and went beyond see unto Luter."

In the following year (1528) another "diabolical damned heretick," a certain John Hig, did penance in this style, so a State paper tells us:—On Palm Sunday he headed the procession to the cathedral, bareheaded, barelegged, shoeless, and carrying a faggot on his shoulder; on Good Friday stood in similar fashion during sermon at the cross; repeated the ceremony on the Sunday in Cheshunt Church; heard mass on his bended knees, and for the rest of his life was ordered to wear the badge of a silken faggot on his sleeve, as an evidence that he deserved burning; and that he was never to leave the diocese of London. But as he recanted, confessing before the public, "I have erroneously and damnably said, affirmed, believed, and taught these damnable and erroneous opinions," and prayed that if he wore the *armorial bearings* assigned him he would never be able to get employ, and so would have to beg, the vicar-general kindly gave him a dispensation as to the silken faggot. And the very same year Humphrey Monmouth, a draper, of London, wrote to Wolsey and the council about Tyndale, that he had heard him preach sermons at St. Dunstan's, Fleet-street, but had not known any evil of him until he heard the bishop say at Paul's Cross that this "Sir William Tyndale had naughtily translated the New Testament!" Poor Tyndale, however, is, after 350 years, to be kindly remembered by the Londoners, and let us hope it will not be far from the scene of his early labours,—St. Dunstan's.

Doing penance was common, and did not, we think, attract large audiences, except when any great personages were the culprits. Here James Baynham, lawyer and martyr, stood with his faggots in 1531, and how he did it is shown by a rude woodcut in Fox's "Book of Martyrs," for poor Baynham was subsequently burnt. Then again in 1533-34, the unfortunate Elizabeth Barton, called "the Holy Maid of Kent," and her accomplices were exposed to the people here while their confession was read, and thence hurried off to execution at Tyburn. And in another four years the famous crucifix, the "Rood of Grace," from Boxley in Kent, which had been supposed to work such wonders, was, on February 14, 1538, exposed by Bishop Fisher at the cross, the people made to understand how grossly they had been deceived, and then the idol was consigned to the flames.

But while all these things were going on locally, a great reaction was taking place, so far as "Bluff King Hal's" prerogative was concerned; and all readers of history know how he crushed the opposition of the Church of Rome to his divorce. Among the State Papers in the Record Office are a number of interesting documents. In one letter, written December, 1533, the king says that he intended "to use the administration of our high autoritie within this our realme as the same may redounde to the utter abolition of the Pope's autoritie to be used or to take any place within the same; like as we may do by thordre of Goddes lawes. . . . . We shall schortly be hable to give unto the Pope suche a buffet as he never had heretofore." If Henry VIII. said he would do a thing he did it, and so he sent nineteen propositions to the Council, the third of which was, "That ordre be taken for suche as shall preche at Paule's Crosse from henceforth shall contynually from Sunday to Sunday prech there, and also teche and declare to the people that he that now calleth himself Pope, with any of his predecessors, is and were but onelie the bysshopes of Rome, and hath no more autoritie and jurisdiction by God's lawe within this realme than any other foreign bysshop hathe, which is nothing at all. And that such autoritie as he hath claymed heretofore hathe beene onelye by usurpation and sufferance of prynces of this realme, and that the bysshop of London may be bounde to suffer none other to preche at Paul's Crosse as he will answer but suche as will preache and set forth the same." And so, Sunday after Sunday, bishops preached down the power of the Pope with a spirit that must have done King Hal much good. But what the citizens liked better was the proclamation made from the cross in 1547 by the Bishop of Rochester, that the king had been graciously pleased to bestow the Grey Friars, Bethlem, and Bartholomew's Hospitals upon them, with certain lands for the support of those houses, and for the relief, &c., of the City poor for ever,—the letters patent being dated January 13, 1547. Then did the Paul's Cross listeners indeed rejoice.

In 1550, says Stow, Sir Stephen, the curate of St. Catherine Cree Church, in a sermon at the cross, denounced as an idol the maypole of the adjoining parish by associating the shaft with the church, and our old chronicler, who lived in the parish, regretfully describes how his neighbours pulled it down and burnt it. And in 1552, when Latimer preached here, he declared that he believed many a person died from being exposed to the weather in the churchyard while listening to the sermons; and there is no doubt but what Latimer was right. Sometimes, when the weather was too bad, "the shrowds" were made use of; but it has not been clearly settled whether this place was a covered gallery outside the church, or belonged to any portion of it inside. It was at the cross on the November following that Bishop Ridley used for the first time the new Common Prayer-book, and took so long to deliver his sermon that his congregation had to go home by torchlight!

Another spectacle for the citizens was the serious riot which took place at the sermon on the 13th of August, 1553. Dr. Bourne, the parson of High Ongar, Essex, and the queen's chaplain, was the preacher, and he praised Bonner and denounced Ridley. This the people took offence at, and there was a riot at once. It did not take long to get up a riot in those days. Some one threw a dagger at the preacher, but it luckily missed him; but had the Lord Mayor and others not been there things might have proved more serious. Anyway the Council at the Tower at once issued an order that in future the people were to be kept at work on weekdays and at church on Sundays, and to use more diligence and discretion; and on the following day another order hinted that if the citizens would not look after the welfare of the City the Lord Mayor had better resign his sword. This was sufficient; for when Dr. Watson preached, on the 20th, the preacher was surrounded by 200 of the Guard, with halberts, and we hear nothing further about the Council order. At the same time it did not stay these kinds of outrages, for on June 10th in the following year, while Dr. Pendleton was preaching, a shot from a gun just missed his head, and went into the wall behind. This appears to have been a busy year at the cross; for in September, Dr. Rodd publicly recanted and, before a very interested audience, repented that he had ever been married; while on November 4th, John Harpsfield, the Archdeacon of London, preached, and struck with a rod five men who, with sheets about them and tapers in their hand, did open penance both at the cross and in the church. But of all the various penances one is mentioned by Pennant, who tells us that, in 1537, a priest, named Newman, bore a faggot, "for singing mass with good ale," and the diarist Machyn says that in 1556 a man did penance having two pigs, ready dressed, upon his head.

These little burlesques appear to have been rather numerous, for in 1554 some one took a cat, shaved its head, dressed it up like a priest, tied its fore-feet together as if in the act of praying, with a wafer between its paws, and hanged it on the gallows by Cheapside Cross. The Bishop ordered it to be exhibited at Paul's Cross, and the rascal who did the deed being denounced accordingly, 20 marks were offered for his discovery.

Occasionally there were great musters of the clergy at the cross; for, in February, 1558, there were no fewer than sixteen bishops present, besides a large number of other clerical gentlemen. In the following December was issued the proclamation forbidding preaching without licence; for, says Hayward, in his "Annals," "the pulpits often serve as drumes and fifes to inflame fury." This caused some trouble; and the earliest place shut up was Paul's Cross. However, in April, a Dr. Samson being about to mount the pulpit, found the door locked and key missing, and when the door was opened by a smith, "the place was very filthy and uncleane,"—clearly showing what little attention had been payed to the cross during the few weeks previously. But the preachers during the reign of Elizabeth were quite a contrast to those of the previous reign. It was on the 4th of June, 1561, that the spire of St. Paul's Cathedral was destroyed by lightning, and on the 8th the Bishop of Durham preached, on behalf of its restoration, from the cross. A few days later the Dean himself delivered that celebrated discourse as before related. Now this must have been a terrible year, for in the following July it rained and thundered so much that the sermons were preached at the Grey Friars instead. A few years later, in August, 1573, we find the Bishop of London writing to Lord Burghley,—"I do what I canne to procure fitte men to preache at the crosse, but I cannot know their hartes, and these tymes have altered opinions. Suche as preached discreetlie the last year now laboure by raylinge to feede the fancies of the people. . . . . Trulie, my ll., I have dealte so carefully as I canne to keep such fanaticall spiritts from the crosse, but the deceiptfull divill, enemie to religion, has so poured out the poison of sedition and so suddenlie changed these wavering myndes that it is harde to tell whom a man may truste." In 1586 Bishop Aylmer complained in like fashion, one accused being the Dean of Norwich.

At this date, in addition to the stipend paid the preacher at the cross, he was provided with lodging at what was called the Shunamite's House. In 1581 this house was kept by a John Churchman, a draper in Watling-street; and here Richard Hooker arrived, wet and weary, when he came from Oxford to preach at the cross. It was a momentous time for him, for he subsequently married John Churchman's daughter; and as she did not make him the best of wives, he had great cause to lament ever having come to preach at our Churchyard pulpit.

In 1595 the cross was "new repaired, painted, and partly inclosed with a wall of brick," Bishop Fletcher preaching a loyal sermon, and music and guns and bells adding a charm to the event. And the next year, on Good Friday, when the citizens were at the afternoon sermon, a precept was brought to the mayor to press 1,000 men, which was done before eight o'clock the same night, showing that they were not slow in obeying the royal commands at that date. When the Earl of Essex returned from Spain, in August, there was a special rejoicing, as is evidenced by the Carpenters' Company paying 4s. 6d. "for a forme" at the cross, and "two men to keep the same," which, we suppose, implies that the crush for seats necessitated such a course.

On the 14th of November, 1602, Dr. Dawson, of Cambridge, kept on his velvet cap while he prayed at the cross; but when he mentioned the queen's name took it off, which caused no little wonderment even in those times. And when in April, 1605, "a cucko flew over the pulpit at Paul's Cross and cried out," it of course was subsequently referred to as a messenger of warning as regards the Powder Plot. In the following year, Parker, the preacher, who is recorded in the State Papers to have been playing cards all night previously, mounted the cross and gave forth a terrible invective sermon, which set the king about him. In November, 1617, a pretty scandal delighted the less sober of the citizens. Lady Markham did penance here in a white sheet for marrying her servant, her husband being alive. She was also fined 1,000*l.*

And here, on the 11th of April, 1619, Bishop King made a thanksgiving sermon upon the king's recovery.

Our monarchs have not been very lavish of late in their royal progresses, but both Elizabeth and James were always going about among their subjects. The queen went to St. Paul's in 1588 to return thanks for the defeat of the Armada, and heard Dr. Pierce, the Bishop of Salisbury, preach at the cross; while on the 26th of March, 1620, James attended Bishop King's appeal on behalf of the restoration fund. It was a great day in the City, and the engraving of the cross at the time is one of the most interesting prints we know of, because it not only shows us the building, but also the costume of the period. It was, as Stow describes it, octagon in shape, built of wood, surrounded by a brick wall. At the top of the pulpit was a huge cross. It has been frequently engraved. Besides the contemporary print, as published by the Society of Antiquaries, the other views of Paul's Cross we know of are shown in Speed's map of Middlesex, 1627; the curious woodcut on the title of an eight-paged tract, entitled "Three Looks over London; or, Plaine Dealing is a Jewell," 1643,—being the very year of the destruction of the cross; and on the title and last page of a 4to. tract, by Henry Farley, printed in 1621, entitled "St. Paul's Church, her Bill for the Parliament,"—all of which, being contemporary prints, must certainly be, to a certain extent, trustworthy.

We are now drawing our eventful history to a close. The exciting periods of Paul's Cross existence had passed. Still there were some occasional causes of excitement, as in 1625, when Sir Robert Howard, the fifth son of the Earl of Suffolk, was excommunicated here for refusing to answer the charges of crim. con. with Lady Purbeck, the sister of the Duke of Buckingham; in 1629, when in May two libels were found stuck up at the cross, which read,—"Oh, king, or rather no king, for thou hast lost the hearts of thy subjects"; and in May, 1631, when Sir Giles and Dorothy Alington for having illegally married, were first sent to the Fleet Prison, then tried by the Ecclesiastical Commissoners, ordered to do penance at Paul's Cross and at Cambridge, Giles being fined in the modest sum of 12,000*l.*, and Michael Dalton, the father of Dorothy, 2,000*l.* The king, however, subsequently remitted the fines.

A doubt has been expressed whether Charles I. ever visited the cross, but in Howe's continuation of Stow's Annals under date May 29, 1630, recording the birth of Prince Charles (afterwards Charles II.), it is stated that on the next day the king and all his court attended at St. Paul's, and subsequently "went into a roome and heard the sermon at Paules Crosse." And, in confirmation of this, Miss Griffiths has a document endorsed "A coppie of verses made by Dr. Sharpe and Sergeant Hoskins upon the appearance of a starre that day in the sermon time at Paul's Crosse (the kinge's majestie being present),"—the date, however, being June 6th on the endorsement.

There is a letter among the State Papers, dated 1631, wherein the Dean of Norwich describes a pulpit in the Green Yard, Norwich, which was both in build and use similar to the St. Paul's Cross at London.

Soon after this was heard the last sermon at the cross. The precise date has not been recorded, but it must have been about the month of April, 1633; for extensive repairs were being carried out to the exterior of the cathedral, and the preaching was removed into the choir. And it does not appear that it was ever restored to the outside. The cross had, in fact, done its duty; times had wonderfully changed. As Dean Milman remarks, "It was a cross, and a cross was obstinately, irreclaimably popish. Down it went; not a vestige of the splendid work of Bishop Kempe was allowed to remain." The votes of the Long Parliament of the 10th and 11th of September, 1642, for the abolishing of bishops, deans, and chapters, settled the fate of both the church and its cross, and while the one was "utterly shaken in pieces," as Dugdale says, the other was taken down by willing hands ready to destroy anything the use of which their blindness was unable to see; and, as we have said, its very site remained unknown, except by tradition, until the month of April, 1879,—perhaps just 246 years after the last sermon had been preached there.

We have already stated that the preachers of the sermons were provided not only with a stipend, but with a lodging while in the City. As this provision was of a most benevolent kind we think a few notes may not be out of place. They are derived from the most reliable of all sources, the wills of the donors themselves, and they will be found not only interesting, but instructive. In Fox the Martyrologist's time the benefactors are stated to have been a round dozen, and ranged over the reigns of Elizabeth and James I. The earliest, however, is Henry VII., in whose will of 1509 is given a special reward "to the precheour at Paules Crosse for the making of the monition of the anniversarie daie." John Ailmer, the bishop of London, by his will in 1594 gave 300*l.* "for the better maintenance of the sermons at Paules Crosse," and 100*l.* more which he had received in trust from Elizabeth Countess of Shrewsbury for the same purpose. Alderman George Bishop, by deed dated in 1607, and confirmed by will, gave his estate in Shropshire to the Governors of Christ's Hospital in trust to pay 10*l.* yearly for ever "unto and amongst such preachers as shall happen to come and preache at Paules Crosse and are not sufficientlie provided for." William Parker, a native of Walsall, gave 200*l.* in 1613 for the like purpose, and in 1617 Robert Jenkinson, on his death-bed, gave 150*l.* Another benevolent individual, one Roger Jeston, in 1622 gave 5*l.* a year; while Thomas Chapman ordered 1s. a week to be paid to such person who should "Keepe sweete and cleane the preaching place at Paules Crosse, and to make it serviceable for the preacher at every sermon," which appears to have been duly done until 1633, for we find "the Vergers of Pawles" complaining to the Deane of the Arches that since the sermons had been removed "from the yard into the quire" they had not received their weekly payment, which they considered they were entitled to notwithstanding that the preaching-place had been transferred. In Stow's Annals it is said that the Corporation of London had, in carrying out the trust of the donors, ordered that "every one that shall preach there may at his pleasure be freely entertained for five dayes space, with sweet and convenient lodgings, fire, candell, and all other necessaries, viz., from Thursday before their appointed day of preaching until Tuesday morning following." And this provision was continued in their hands to administer by special orders of the Parliament in September, 1642, and May, 1643. Malcolm tells us that the fund amounted to 1,770*l.* besides rent-charges of 44*l.* 6s. 8d.; and that the stipend, formerly 45s., was subsequently reduced to two pounds. After the Fire of 1666 the sermons were preached at St. Catherine Cree Church, then at Guildhall Chapel, and St. Mary-le-Bow, Cheapside, as appears by the Harl. MS. in the British Museum.

We have already alluded to the fact that persons desirous of securing good seats, or any seats at all, at a popular preacher's sermon, had to send one or two servants to keep them. Now we have been so fortunate as to discover a very interesting item in the will of an old citizen of London, not only confirming our assertion, but illustrating the fact of certain questionable practices of paying for these seats in a very marked manner. A John Dunster, who died in 1625, gave to the Dean and Chapter of St. Paul's 100*l.*, upon trust, that they shall, "within the space of one yeare next after my decease," take such steps to prevent in future "the gathering of monie for seates upon the formes at Paules Crosse in the tyme of prayer and sermon," whereby "great disquiett and disturbance is made to audients." And should the said Dean and Chapter fail to carry out the order "for the avoyding of the said gathering for seates, then I give the said sum of 100*l.* to my son John Orlisbeare." Whether the legacy went to St. Paul's or to the testator's relative we have no records to prove, but the note is curiously suggestive of similar transactions in this nineteenth century, where seats are more comfortable, and people more desirous probably of running after a "fashionable" preacher than listening to a more homely and sensible although a less popular and "patronised" disciple of those of yore at Paul's Cross.

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**Fall in France.**—A terrible accident took place on Sunday last at Montmartre. The scaffolding of a house in course of erection fell, carrying with it an unfinished wall, and burying nine workmen in the ruins. Four of the men were killed on the spot, and the remaining five are maimed for life.

## LARGE AND SMALL TOWNS.

EVERY part of England and Wales, except the metropolis, is placed by the Public Health Act under a local sanitary authority, either urban or rural. It is with the urban populations only that we are now concerned. The Public Health Act applies to more than 900 towns, varying in population from 1,000 to 500,000. Whether we might prefer to call a place of 1,000 or 2,000 inhabitants a village or a town, it will be more convenient to call every place a town which has an urban sanitary authority under the Public Health Act. The local authorities of towns are either corporations, constituted under the Municipal Corporations Act; Improvement Commissioners, constituted by special Acts of Parliament applied for by the inhabitants of towns; or Local Boards, so called, which are constituted by provisional orders of the Local Government Board, and which are applied for by the inhabitants, and afterwards confirmed by Acts of Parliament.

The business of every local authority consists of two parts, two kinds, or two classes,—the necessary and the convenient. In the first class are included those things which are necessary to the health of the population, such as a supply of water for use, and drains and sewers to carry it out of the town again after use; healthy dwelling-houses and workrooms; wholesome meat; and baths and recreation grounds; indeed, all those things which constitute the sanitary necessities of a town population. In the second class are included those things which are for the convenience of the inhabitants, such as good roads and footways, sufficiently wide and unobstructed, public buildings, markets, abattoirs, the lighting of the streets, police regulations, prisons, and other things which we cannot well do without, although they may not be absolutely necessary; and, *sine quâ non*, there is the very important business of providing the means of paying for what is necessary and for what is convenient. Whether the town be large or small the local authority have to attend to all these things, and yet in the application of a Public Health Act to towns there is a great difference in the requirements in that respect between large and small towns. Excepting the metropolis, the Public Health Act applies to all towns, both large and small; but the circumstances of large towns differ much, essentially, from those of smaller towns, and it does not seem possible to do justice to both under one Act. The provisions of the Public Health Act are very useful as far as they go, to the smaller towns, but they do not go far enough for the requirements of these, while in the large towns many of its provisions are not suitable to the circumstances, and some which would be useful are not contained in this Act.

The provisions of an Act which would be very salutary in their application to the smaller towns if applied with the full force which is desirable in the interest of the public health, are stultified by this proviso and that, to make them acceptable to the authorities of the large towns. Nevertheless, these resent the application of the Act, and in their hands it becomes almost a dead letter, or is applied very unwillingly; and the resentment of this interference in sanitary affairs leads to opposition to proposals of the Government in other affairs which would probably be advantageous to the country at large without doing any harm to local interests, and which, but for the major offence, would probably not be opposed by the local authorities. The power and influence of the corporations of large towns are very real and very great, and they are made felt by the Legislature to the disadvantage of the smaller towns, which really need the help of such a law as the Public Health Act, or such as it might be if not trammelled with the necessity of meeting the objections of the authorities of the large towns to its provisions in their full intent and meaning. In the councils of the large towns there is a miserable feeling of hostility to any interference of the central Government in affairs which they consider to belong wholly to them, including sanitary affairs; although it must be said that these are not of merely local bearing, but have influence beyond the local boundaries, and have, indeed, an influence for good or for evil on the general welfare of the country. As long as this feeling of hostility exists it hinders the carrying out of sanitary measures with spirit and with a full recognition of their benefit. The benefit of sanitary works is not palpable, as works of convenience are, although capable of proof, no doubt, and in some instances it has been proved; but generally proof is not sought for,—indeed, it is discouraged, as if those who are able to prove the truth might prove more than would be convenient, or were dishonest, or at least exaggerate their statements in order to make out a case for private ends. How can the health of a town be established or maintained under these circumstances? It would be better to let the large towns go free, and throw the responsibility upon the local authorities of making what laws may seem good to them, rather than continue a semblance of authority on the part of the central government when there is none in reality. The local authorities of the large towns,—or of the largest towns, let us rather say,—are sufficient in, of, and for themselves. They have a complete official organisation, sufficient for all purposes, and they are for local self-government in its entirety, and against any interference, assistance, or advice of the central government or any department of it, whether the head of the department move with the politics of the time or remain permanently in office.

But the case is very different in the small towns. They have not the means, even if they have the will, of carrying out the sanitary business of the town in a manner satisfactory at once to the ratepayers and to the demands of the public health.

Dr. B. W. Richardson says, in his treatise on a "Ministry of Health," that "whenever the question of legislative procedure is brought forward in England, we have to consider in relation to it two distinct orders of mind,—the centralising and the self-governing." But we should rather say that what we have to consider is not distinct orders of mind, but the distinction between the circumstances of the large towns and those of the smaller towns. In the large towns there is a good deal of public spirit, and some emulation amongst them, to establish and maintain a high standard of public health, and it is the pride of place and sense of power which make them impatient of any interference of the central government. The same feeling exists to some extent in the smaller towns also, for towns in their habits follow towns, but in the small towns this feeling has no foundation in reason, and if the example of opposition to the authorities of the large towns were got rid of, there would be, we believe, in the smaller towns little or none of this unreasonable opposition to the legislative procedure referred to.

Should not, then, some of the largest towns,—even as the metropolis already is,—be excluded from the operation of an Act the provisions of which are more suitable to the smaller towns than to them?

The question arises, in the first place, how many and what towns ought to be excluded. It might well be thought on a first consideration of the subject that towns graduate pretty regularly in size and number, from small to large; and if that were so it would be, indeed, difficult to draw any line which should separate the great from the small; but that is not so in fact.

If we take the urban sanitary authorities, stated in Knight's "Local Government Directory for 1879," which, though not accurate, may enable us to arrive at the approximate numbers of people in towns in England and Wales, we find them to be as follow:—Beginning with places of 1,000 inhabitants there are 447 urban populations under 5,000 in number. The aggregate population of these is 1,290,000, and the average 2,884. There are 247 small towns of 5,000, and less than 10,000, inhabitants, the aggregate population of which is 1,673,000, and the average 6,772. There are 170 towns of 10,000 and under 30,000, the aggregate population of which is 2,782,000, and the average 16,336. If we proceed with towns of 30,000, and under 60,000, we find 41 having an aggregate population of 1,700,000, and an average of 41,467. Of 60,000, and under 100,000, there are 11 towns, the aggregate population of which is 835,000, and the average 75,900. From 100,000 to 200,000 there are 11 towns, having an aggregate population of 1,630,000, and an average of 148,300. Above 200,000, there are 5 towns the aggregate population of which is 1,898,000, and the average 379,600.

These include all towns in England and Wales, except the metropolis.

It will be found, beginning with places of 1,000 population, that there is a slowly gradual increase in numbers of population up to about 10,000; then that the population increases in a higher ratio than the number of towns, up to about 30,000; above that number, the increase is quicker; and above 100,000 quicker still. There are evidently here very extreme circumstances, which do not advance at all gradually, but seem to demand consideration in—say three—groups of towns. Of those of more than 100,000 population there are sixteen, containing a population of nearly four millions. Of those of less than 100,000, there are 916, containing a population of more than 8,000,000. Of these, there are 694 towns of less than 10,000 population, containing about 3,000,000. Between the two extreme divisions of 10,000 and 100,000, there are 170 towns of from 10,000 to 30,000; 41 from 30,000 to 60,000; and 11 from 60,000 to 100,000.

These three great divisions, then, would stand thus:—

1. 694 towns under 10,000 population;
2. 222 from 10,000 to 100,000;
3. 16 above 100,000 population.

If, now, the State gave up all interference in sanitary affairs in these sixteen large towns, is it probable, or even possible, that the status of the public health would derogate from what it is now? It is hardly possible that it could do so, so little is it which is now effected under existing legislation. It would probably be sufficient for the Government to procure from the large towns a record of events; a periodical statement of the sanitary condition of the town from the medical officer; and a statement by the engineer of works done and in progress, leaving the conduct of the business wholly to the local authorities, both in its inception and accomplishment.

To the towns of the middle division the present Act might apply as it stands. In the small towns of, say less than 10,000 population, the central government should have direct control to this extent, viz., that for a number of towns, the aggregate population of which amounts to 100,000 or thereabouts, there should be a medical officer of health and a superintending engineer, who should be consulting officers. In each town there should be a resident engineer, who may be called the surveyor if thought desirable, although that term will soon become obsolete for this office, and the more proper term, engineer, substituted; and an inspector, who should be the representative of the medical officer; the inspector and the resident engineer being in intimate communication, and being the executive officers by whom all sanitary work in the town would be done; who would have no official communication with the local authority, but would act under the general instructions of the medical officer and the superintending engineer.

These two would attend the meetings of the several Boards in their district; would advise with them as to what, if anything, might be necessary to be done; and from these two officers all orders would proceed; and they would be responsible to the Local Government Board that everything which would be done would be necessary to the public health.

The ratepayers could have no better protection than that, while the canons of the public health would be duly observed.

Every one of these officers should be paid directly by the central government, and not out of the local rates. We are not without experience of the results of permissive sanitary legislation in small towns, and without some formula of this kind, rigidly adhered to, there is, we think, no hope of making the benefit of sanitary work palpable, and unless that be done it will never be popular, and until it is so it cannot be properly carried out so as to become of real value to the nation.

The question arises in its due place,—what things are necessary to be done to effect the object desired? A ministry of health,—if it justify its appointment at all,—must be able to decide without question what is necessary in every case which comes before it. No ministry would sanction what is unnecessary, and the sanction of that which is necessary would be at once a satisfaction and a protection to the ratepayers. Whatever would be done would be done well, although in many cases little might be required; but the great thing to be brought about is the certainty that that which would be done would be necessary, and would produce in its operations a full recompense and benefit to the ratepayers.

At present the local authority of each small town think they ought to have local self-government as well as the large towns, and the consequence is that when anything at all is done there is no certainty that it is necessary, while

much that is so is left undone, the result being unsatisfactory alike to the ratepayers and to the demands of the public health.

We did not intend to touch upon rural sanitary authorities, but inasmuch as there are many small towns in the rural sanitary districts, larger than some of those constituted urban districts under local boards, and surrounding these, or being near them, it would be proper that the rural sanitary authorities should have the privileges of consulting, unofficially, the two chief sanitary officers we have named, and of paying them for their services on a fixed scale of charges. It would not be compulsory on the rural authorities to employ them, but it would be very advantageous to them to have in their own neighbourhoods gentlemen of their qualifications and authority.

Many people have no true conception of the state of things in small towns. They are so small that, acting alone, as they do, the local authorities can do nothing effectually. No official persons at all are really desired, and in many cases none are employed, except those the appointment of whom is made imperative by the Act. Official reports of the needs of the inhabitants are inconvenient, and the local authorities of these small towns have no sufficient public spirit to demand them, although they are made occasionally to save appearances and make the Local Government Board believe that something is being done. Do the inhabitants of a small town, having outgrown in numbers the sufficiency of the ancient and natural springs of water, and defiled that in the ground beneath their feet, need water, and is it reported that there ought now to be procured a sufficient supply? Does the refuse of that little which they can procure lie about the thresholds of the houses for want of drains to carry it off? Are the houses, in consequence of both these wants in a populous place in a generally dirty condition? Have speculating builders run up radically unhealthy houses? Where is the practical remedy for these things? There is none at present with any certain action.

## COAL-MINES.

We have now lying before us a newly-published work, entitled "Coal-mines Inspection: its History and Results."* It contains a great deal of interesting and useful matter transplanted from the Reports of various Commissions, Acts of Parliament, and other documents. But, as a literary work, it will not stand examination, for the matter collected is put together wholly without method or system. Starting with the condition of the colliery population previously to the present century, we come down to contemporary events through a mass of detail put together, as we have said, without any proper sense of arrangement. For example, at page 74 we find some observations upon the series of explosions which took place in the year 1845, especially with reference to one at the Jarrow Colliery; then, suddenly, without any break of paragraph, we are on the succeeding page told about the way in which, in some cases, women were still employed in underground workings; and by the bottom of the page we have reached the subject of strikes. In such books as this, careful arrangement is most important; and we can only attribute the muddled character of this work to hurry on the part of the writer. For to put into a book all the materials which he has done implies much industry on the part of the author; and the fact that we are supplied with an index shows that Mr. Boyd does not wish to shirk the task which he has undertaken.

We will endeavour, however, to touch very briefly upon a point or two which are apparent in connexion with collieries which may interest our readers at the present time, and for these there is no lack of material in this book.

The question of inspection is, perhaps, the most noticeable of these, because it shows the complete change in public opinion which has taken place during a comparatively short period of time, and how completely the idea of the right of colliery owners to conduct mines on their own principles and their complete irresponsibility has been broken down. The first time that inspection was mooted was when Lord Ashley (now Lord Shaftesbury) brought in a Bill in 1842 to prohibit the labour of women underground and to restrict the labour of boys. One clause made provision for the appointment of two inspectors to visit the mines and make reports thereon. But this was not subterranean inspection, for said Lord Shaftesbury, "as for subterranean inspection it is altogether impossible, and, indeed, if it were possible it would not be safe." The Bill in question became law, and inspectors were appointed in pursuance of the provisions of the Act. But in 1846 a petition was presented to the Government of the day by a number of colliers asking them to appoint inspectors of the underground workings, and on the 16th of June, 1847, Mr. Duncombe introduced a Bill with this object into the House of Commons. It was characterised by the champions of the colliery interests as "most ridiculous," and Mr. Duncombe was for a time unsuccessful in his efforts. But the subject underwent long debate and investigation, and when in July, 1850, Lord Carlisle introduced a Government measure upon the matter, it met with a great deal of opposition. Thus it was characterised by the Marquis of Londonderry, the chief champion of the coal proprietors, "as the most mischievous and unjust measure that could possibly be imagined"; and Lord Brougham, carrying a proper principle in a wrong direction, called it "an unjustifiable interference with the rights of labour." Passed, however, the Bill finally was, and the "Act for the Inspection of Coal-mines in Great Britain" became law on the 14th of August, 1850. By it the principle that it is the duty of the Government to watch over the working of the British coal-mines was firmly established, and it became the basis of all the subsequent legislation on the subject. That it has proved the panacea for the many lamentable accidents which took place in collieries from time to time, as some of its supporters expected, has been clearly proved not to be the case; but that it has been a useful measure no one can possibly doubt, and one which has not only benefited the workers in, but the proprietors of, the mines. For improper working for the sake of economy is almost certain, sooner or later, to end in a great disaster.

"It is an ill wind that blows no one any good," says the proverb, and we may point to the great calamity at the Hartley Colliery, in the beginning of the year 1862, as an illustration of this saying. For it was in consequence of this accident at this pit that an Act was passed by the Government forbidding collieries to be worked without at least two exits. This, indeed, is an instance of the manner in which colliery legislation, as it may be termed, has taken place. It has been all more or less piecemeal in its character. An event here or an event there has caused the attention of the Legislature to be directed to some particular point, and thus an Act of Parliament appears in the statute-book directed to the matter. But glancing back over the past years of the present century, it is impossible not to perceive the rapid strides which the moral and physical well-being of the colliery population of this country has undergone. Women's labour has been stopped and boys' has been restricted, inspection has been acknowledged as a principle, the truck system has been abolished, education has been vastly improved, and co-operation has set in amongst the men. In some respects, we willingly admit, this latter fact has not been in all its aspects satisfactory, for we have seen the miners acting in union often wholly unmindful of the circumstances of the time, the elementary maxims of political economy. But as we say, taking the present century as a whole, no one can doubt that this portion of the English population is in a far happier and more prosperous state than it was eighty years ago, and by so much has the well-being of the country in general been increased.

* Coal-mines Inspection: its History and Results. By R. N. Boyd, F.R.G.S. London: W. H. Allen & Co. 1879.

**The Bristol Builders' Strike.** — It is reported that the masons on strike are succeeding in sending back to Manchester some of the workmen who have been taken to Bristol by the employers. The men have written to the employers asking if they wish to meet them to consider the present position of the dispute. The members of the Master Builders' Association have replied that if the masons on strike have any new basis on which to suggest a settlement they would be glad for them to submit their views in writing, and if the employers considered it desirable they would arrange an interview between them and the representatives of the men. The men, however, have declined to make any concession, or to change their views as to the position they have taken in the dispute.

## SHONE'S PNEUMATIC SEWERAGE SYSTEM.

On Saturday, the Lancashire and Cheshire Association of Sanitary Engineers and Surveyors held their ninth district meeting in the Townhall, Wrexham, under the presidency of Mr. Edward Pritchard, C.E., vice-president of the Association, upon which occasion the mayor, Mr. Isaac Shone, explained the principle and working of his pneumatic sewerage system and patent ejector.

His Worship proceeded, by the aid of diagrams representing an ideal station, to point out the principal features of his invention as follows:—"The 'ejector' consists of a hollow, closed vessel, of spherical, cylindrical, or other convenient form, so placed as to allow the liquid to flow into it. An air-compressing steam-engine, turbine, or waterwheel, is required to produce the necessary air-pressure, and this engine could be applied to work any number of these ejectors, at any distances away from the engine. Inside the ejector are two small cylinders, each being open at one end, and closed at the other, termed the 'bell' and the 'cup;' the latter is always filled with the sewage. The cup and bell are connected together by a rod, and a small rod passes from the upper one,—the bell,—through a stuffing-box in the cover to a lever which actuates a small slide-valve, governing the action of the automatic piston-valve, so as to alternately admit compressed air to the ejector, and let it escape. When the ejector is nearly full, the liquid, as it rises, encounters the bell, thereby drawing back a small slide-valve, admitting air-pressure to one end of the automatic piston-valve, the outer ends of which act as the motive piston, the middle portion acting as the valve regulating the inlet and the exit of the compressed air. The piston-valve being thus moved over, opens the ports admitting compressed air to the ejector. The compressed air thus entering forces the sewage out through the delivery-pipe, a ball or other valve being placed both at the inlet and outlet, to prevent the back flow of the liquid. The cup and bell arrangement being balanced, and the weight of liquid in the cup being neutral so long as it is submerged, retains its position until the vessel is nearly empty, and the liquid begins to pass below the cup. The dead weight of the liquid in the cup then acting downwards, pulls the cup and bell down, reversing the small slide-valve, and so, shooting the piston-valve over to the opposite side, shuts off the compressed air, and opens the ejector to the exhaust. The compressed air at once rushes out, allowing a fresh charge of the liquid to enter by gravitation, and the action is repeated. It will be seen from this that the apparatus is extremely simple, certain, and positive in its action; and that it is scarcely possible for it, under any circumstances, to get out of order. Large quantities of sewage can be dealt with, and yet the only controlling mechanism consists of a very small piston, making an easy, silent stroke of only 2 in. or 3 in., and not more than once in a minute at the most, by which a practically frictionless, absolutely unwearable and inexhaustible air-piston is applied to the surface of the sewage, searching out and following down the sewage from every corner of the ejector, and this takes the place of the ordinary heavy pump bucket and ram, with its many strokes per minute, all its valves, clacks, and other moving parts,—its great loss of power by friction in the cylinder, glands, &c., its waste in clearances, valve passages, &c., its heavy wear and tear, and its great liability to get out of order. A drawing exhibited represented a section of a sewage-collecting station. The gravitating sewers were shown discharging their contents into a small reservoir, and in order to intercept large floating bodies, such as bungs, sticks, &c., a trap is provided at one end of the reservoir, the floating bodies being kept back by a diaphragm dipping into the sewage, from which they can be removed as occasion requires, through the shaft above. The trap may be considered as a refinement of the system, not actually necessary, as in the practical trials at Wrexham no difficulty has been experienced from these bodies passing through the ejector. An iron pipe, called the 'inlet-pipe,' is provided to convey the sewage from the reservoir into the ejector. Behind the ejector is the 'discharge-pipe' therefrom, through which the sewage would be ejected into the iron 'sealed main sewer,' or to a gravitating

sewer above. The compressed air main is near the top of the figure, and the branch 'air supply-pipe' is in the centre of the ejector chamber. The air escaping from the ejector after each discharge of sewage would pass off by the 'exhaust-air pipe' leading into the reservoir or gravitating sewer, which would be thoroughly ventilated thereby. The sealed main sewer, into which the sewage would be ejected, may lead directly to the outfall, following the irregularities of the ground at any convenient depth,—say 3 ft. below the surface, or into a gravitating sewer. It will be understood, from the foregoing, that complete control is exercised by this system over the gradients of the gravitating sewers, as each 'ejector' district would be so arranged as to extent that the sewers therein would not be of such length as to require deep and expensive cuttings to give them their proper inclinations. Again, it will be seen that the moment the sewage has been discharged from the ejector into the sealed main or gravitating sewer, all communication, both with the street and house sewers, as well as with the atmosphere of the town, is completely severed. By no possibility, therefore, it is maintained, can the smallest volume of sewer gas find its way back from the sealed sewer along the gravitating sewers leading into the ejector. Indeed, exhalation of all kind from the sewage is reduced to its minimum, owing to the good gradients of the sewers leading to the ejector, and as any desirable speed can be given to the expulsion of the sewage into and along the sealed sewer by varying the air-pressure, the sewage will be delivered at the outfall in a fresh condition, and consequently of more value, in a manurial point of view, when applied to land."

## SANITARY ASSOCIATION OF SCOTLAND.

THE fifth annual meeting of this Association was held in Dundee on the 25th ult. Mr. William Mackison, Burgh Surveyor, Dundee, the president, occupied the chair, and was re-elected president for the ensuing year. Mr. Fergusson was elected vice-president, and Mr. John Shaw was re-appointed secretary. It was resolved to hold the next annual meeting at Stirling on the third Wednesday in June, 1880.

The President, in the course of an able and interesting address, in which he reviewed the progress and work of the Society, said,—I am not satisfied that the annual meetings are in themselves sufficient to maintain a salutary interest in the requisites of public health amongst the members. I am rather disposed to think that we must organise district quarterly or periodical meetings, such districts being carefully considered, each having a small committee with a chairman or convener to control the business. These meetings need not be confined to one town of any district, but might be held at different convenient places throughout such district, so as to give the greatest possible opportunities to the several members meeting together and discussing questions of sanitary importance; of considering difficulties occurring in the discharge of their duties; and in reading papers bearing on the more efficient and desirable manner of securing the good sanitary condition of their several localities, and of the country at large. Working thus from a number of centres, the operations of the Sanitary Association would be felt to have more of a national character, and be of more practical value than at present; and during this session I sincerely trust that a decided step will be taken in this direction. I have always held that public health is a matter that concerns everybody, and therefore a matter about which every person should be concerned, and should concern himself; and hence when I speak of districts being formed over the whole of Scotland, and these being looked after by different committees, I expect that in every district there will be a large number of gentlemen who take an interest in the good sanitary condition of their locality that will join an Association and take an active part in its work. I am glad that last year the door of admittance was made wide enough to take all such in; and I am sure of this too, that the members will receive with delight an accession to their numbers of all those who are actuated by desires for the furtherance of anything calculated to make our fellow-men more comfortable in their homes, more exempt from disease, more elevated in their habits, and more certain of length of days.

Mr. Kenneth MacLeod read a paper on "The Neglected Powers of the Public Health (Scotland) Act." He observed that the first and greatest neglected power was that shown by many Local Authorities who did not appear to have yet in any way made a move in the adoption of any part of the Act at all. Of 887 Local Authorities, only 645 were reported in the Board of Supervision's return, leaving 242 districts in which no money was expended on sanitary supervision. In 1874 only 658 sanitary inspectors had been appointed; but inspectors of poor in many places had the title, but neither the duties nor the pay, and in these districts the Act was a dead letter. Another neglected power was the erecting of hospitals for the isolation and treatment of patients suffering from infectious diseases. In the year from May, 1874, to May, 1875, seventy-five districts in Scotland reported outlays for hospitals, and only fifteen additional had been reported since. In the county of Lanark, the most populous in Scotland, there were thirty-seven districts in which the powers of the Act ought to be carried out. Five of these districts, with populations numbering from 16,000 to 34,000, composed chiefly of mining and iron-working classes, among whom infectious diseases greatly prevailed, were till recently without hospital accommodation of any kind, and only one had since been provided. Nine districts, with populations numbering from 7,000 to 10,000, were equally deficient. Now the want of these places meant the treatment of small-pox and fever in the small crowded dwellings of the sufferers, and treatment under such circumstances meant the multiplication of centres from which death radiated. Twelve populous districts in the neighbourhood of Glasgow which had no hospital accommodation, placed in contrast with Glasgow which had such accommodation, showed the death-rate in one quarter of a year, and that the quarter when this dreadful disease was at its worst, to have been 3½ per cent. of the total deaths; while in all the other districts which had no hospital accommodation it was higher, and in six of them reached the portentous heights of 23, 24½, 28½, 30, 33, and 34½ per cent. No Local Authority should allow the power conferred upon it to erect hospitals for the treatment of infectious diseases to remain unused. In further illustration of evils arising from neglect in adopting the powers of the Act was that of furnishing proper water-supply in populous districts. The power to obtain that unspeakable blessing had been in the possession of every Local Authority during the past thirteen years, and within all that long period only 129 districts out of 887 had reported outlays on that account. The powers to lay down a proper system of drainage had been neglected to a lamentable extent in many rural districts. Only 130 districts had reported movement in this direction.

Mr. John Shaw, the secretary, gave an address entitled "A Plea for Sanitary Instruction in Schools"; and Mr. G. D. Macdougald, public analyst, Dundee, read a paper on "Sanitary Science and Chemical Analysts."

After some discussion, the meeting terminated, and the members, after visiting the Public Baths, dined together in the Queen's Hotel.

## THE DERBY FREE LIBRARY AND MUSEUM.

ON Saturday, the 28th ult., the new Free Library and Museum building, Derby, was formally, and amidst great public rejoicing, presented to the town by Mr. M. T. Bass, M.P., the munificent donor of the entire structure and fittings. The foundation stone of the new building, which stands in the Wardwick, on the site of the old library, was laid in October, 1876, by the donor. The architect of the building is Mr. R. Knill Freeman, of Bolton and Derby, whose designs were selected in competition. The plan is as nearly as possible in a square. The principal entrance is placed in the centre of the main front, and has a spacious hall, opening by a glazed screen and folding doors into a corridor. The room at the end of the corridor to the left of the entrance is intended for use as a ladies' reading-room, and is separated from the general news or reading-room by an open wrought-iron screen. The corresponding room at the other end of the corridor is for students attending the reference reading-room. On the opposite side of the corridor, and occupying the central portion of the building, is placed the lending library, 56 ft. by 24 ft., and carried up to the full height of the building, nearly 40 ft., having a small gallery carried round with bookcases in it. The lighting of this apartment is effected by a lantern in the roof, and additional light is procured by the windows between the bookcases at the back. The entrances for the public are near each end of the corridor. The floor of the library within the counter is raised some 1 ft. 4 in. above the other floor, in order to give the librarian and his assistants better facilities for the thorough supervision of the adjoining departments. The division between the library and the main corridor, and also between it and the reading-rooms on either side, is of timber, with the upper portions glazed in lead work. At the right of the library is placed the reference reading-room, 56 ft. by 24 ft., having an additional large semicircular bay in the centre of the side, for the use of students. It is lighted by large windows at the side and end, and the artificial lighting is by large globe-lights manufactured by Benhams. The newsroom is placed on the left of the library, and is similar in size and other respects to the reading-room.

A small angle turret is placed at the north side of the building, near the curator's house, having a spiral staircase going from the bottom to the top of the building, and opening on to each story. An entrance to the ground-floor, for the librarian's use, is placed on the ground-floor, thus giving direct access from his house adjoining.

On the left of the main entrance a small room is provided for a private office for the chairman and secretary.

On the right of the entrance is placed the staircase to the basement. The principal staircase consists of flights of steps opening from the corridor on each side of the hall, and meeting in a central flight from the first to the main landing. It is of Hopton stone, with metal balustrade and massive oak hand-rail, and is of good width and proportion generally. The corridor on the upper floor has been so arranged as to serve as a sculpture-gallery, and is separated from the staircase by an open arcading.

At the end of the upper corridor, to the left of the main staircase, is the curator's room, lighted by a large oriel window. The corresponding room at the other end of the corridor is the committee-room, otherwise called the panelled room.

The museum forms three sides of a square, having ingress and egress at each end of the corridor, thus avoiding any confusion and clashing between people entering and leaving.

With the exception of windows in the circular bays, the whole of the museum is lighted by lanterns and ceiling lights from the top.

The central room at the back of the museum has been arranged to serve as a picture-gallery. The roof is supported on stone corbels at the angles, carved to symbolise the four seasons.

At the north side of the building is placed a house for the curator, and at the south a lodge for the porter, containing, in the basement, the heating arrangements for the museum buildings.

The style of the building is described as "Jacobean." The front elevation has the entrance-hall carried up as a tower, with octagonal angles, finished with open timber turrets. The central part of the tower is also of open timber work. The wings have the roofs hipped back, and the ridges finished with wrought-iron ridge-cresting and finials. The space between the tower and wings is arcaded in both stories, but in general treatment is subordinated to the more important parts of the design. Large oriel windows, with splayed angles, are placed in the wings, and a circular one over the main entrance. The exterior of the building is faced with the best Derby pressed bricks, with moulded strings, arches, &c., of Coalville bricks. The dressings, oriel windows, turret, &c., are of Stanton stone. Terra cotta is introduced in panels and other places. This has been executed by the Coalville Brick and Tile Company, from designs specially prepared by the architect. All the external timber-work is of oak. The staircase, corridors, steps to front entrance, &c., are of Hopton Wood stone, polished. The roofs are covered with strawberry-coloured Broseley tiles. The glazing of windows and screens in the principal parts is of cathedral glass, of different tints, in lead lights, arranged in geometrical patterns. The internal joiner's work is of yellow deal, painted.

Ventilation has been provided for by the ad-

mission of pure air in various places, and by a system of exhaust-shafts to collect and remove the vitiated air. These are carried up into the tower, and terminate in Howorth's ventilators.

Store and work rooms are placed in the roof of the wings. Provision is made in the basement for store-rooms, heating-chamber, lavatories, &c.

The building is set well back from the line of the Wardwick, which has been considerably widened at this part, and it is enclosed by a substantial stone curb, surmounted with wrought-iron railings.

The several works have been executed by the following firms:—

The general contractors for the building were Messrs. G. Woods & Son, of Blackburn, Derby, and Bolton. The ornamental glazing has been done by Mr. Evans, of Birmingham; the decoration, by Messrs. Best & Lee, of Manchester; the metal work by Messrs. Freeman & Collier, of Manchester; the heating by Mr. Crump, of Derby; the ventilation and gas-fitting by Mr. Evans, of Derby; the electric and other scientific appliances, by Mr. Davis, of Derby; the carving by Messrs. Earp, of London and Manchester; the marble concrete floors in corridors, by Mr. Oppenheim, of Manchester; and the marble mosaic in the hall, by Mr. Burke, of London and Paris. The bricks were supplied by Messrs. J. Kent & Co., of Derby; the iron girders, by Messrs. Fowke & Co.; the ventilating apparatus for the museum by Messrs. Handyside & Co.; the iron palisading to the Strand, by Messrs. Handyside & Co.; the stoves by the Derwent Foundry Co.; the marble chimney-pieces and hearths, by Mr. Tinkler, who also executed all the wood-carving and models for plastering. The wood-turning throughout the building has been done by Mr. Harrison, St. Mary's-gate; the book-cases, chairs for reading-rooms, and fitting up of chairman's room, by Mr. Jones, Market-place; the oak tables for reading-room have been supplied by Messrs. Saunders, Abbey-street; the fitting up of the committee-room, and oak newspaper-stands, has been executed by Messrs. Cochrane & Bean; the fitting up of the curator's room by Messrs. Topham & Hamlet; and the cases in the museum have been made by Messrs. Sage, of London. Mr. Cooling, Milesah Nursery, Derby, laid out the grounds and supplied the necessary planting.

The whole of the works have been carried out from the designs and under the superintendence of the architect.

## CONGRESS OF THE BRITISH ARCHÆOLOGICAL ASSOCIATION.

THE thirty-sixth annual meeting of this Association will be held in Great Yarmouth from Monday, August 11th, to Wednesday, the 20th inclusive. The following are the heads of the programme:—

*Monday, August 11th.*—Opening meeting at the Town-hall; reception of the President and members by the Mayor and Corporation, and delivery by Lord Waveney, president of the Congress, of the inaugural address; after which the municipal regalia, ancient deeds, charters, and MSS. will be inspected; under the guidance of the Rev. J. J. Raven, D.D., the members and visitors will then perambulate the town, inspecting the old town walls, towers, ancient houses, crypts, &c.; a public dinner will be held at the Star Hotel, at seven o'clock p.m., the President in the chair.

*12th.*—Visit Martham, where the church will be examined and described; return by train for Caister for the inspection of recent excavations, and thence to the site of the Roman camp and the castle; afterwards to Filby Church, then on to Ludham, where luncheon will be partaken of at 1·30 p.m., and at 2·30 p.m. the party will proceed to Horning for the inspection of the ruins of the Great Abbey at St. Benet's-at-Holm; evening meeting at Yarmouth.

*13th.*—Visit to Burgh Castle, which will be inspected and described; then Fritton Church, St. Olave's Priory, and Haddiscoe Church, and thence to Somerleyton, the residence of Lady Crossley; after inspecting the hall and grounds, the party will proceed to Lowestoft, where St. Margaret's Church will be visited; evening meeting at Yarmouth.

*14th.*—Visit Harleston, Wingfield Castle and Church; reception by the President, Lord Waveney, at Wingfield Castle; to the Abbey, South Elmham, the "Old Minster," and Roman camp, Flixton Hall; afterwards Bungay, and thence, after inspecting churches, &c., to Great Yarmouth; evening meeting.

*15th.*—Visit to Darsham. The church will be inspected, and then drive to Dunwich, where the ancient ruins, &c., will be inspected and described; leaving there for Blythburgh, where the church and priory ruins will be examined; and at 1·30 p.m. the party will proceed to Southwold. Luncheon will then be partaken of, and the church visited and described. Evening meeting at Yarmouth.

*16th.—Yarmouth Day.*—Examine the parish church of St. Nicholas and the Benedictine Priory, which will be described and commented on. Afterwards the party will visit the Rows, the ancient toll-house, and other objects of antiquarian interest in the town. After luncheon proceed to Gorleston; visit the church and remains of the priory; returning to the residence of the Mayor at Ferryside, Southtown, for an afternoon reception by the Mayor and Mayoress. Closing meeting at the town-hall at night.

On Monday, the 18th of August, and two following days, the Congress party will take up their quarters at Norwich, where, under the guidance of the Dean of Norwich, the cathedral will be examined and described, and the churches and old buildings, with other places of interest in and about the ancient city, under the guidance of resident clergymen and members of the Norfolk and Norwich Archæological Society, co-operating with the British Archæological Association, will be visited and commented on.

## ANOTHER IMPROVEMENT IN FARRINGDON-STREET.

THERE are few streets in the City that have undergone greater transformations during the last quarter of a century or so than Farringdon-street and its neighbourhood. The abominations that existed upon what was once the course of the partially navigable river Fleet and its purlieus have long disappeared, or are fast disappearing. The Congregational Memorial Hall has been built upon what was part of, or very near, the site of the Fleet Prison, of evil memory. Immediately adjoining the Memorial Hall, on the south side thereof, a business house is almost completed that does not discredit the situation, or show incongruity in its rather trying juxtaposition to the loftier and more imposing structure.

The warehouse referred to is to be occupied by Messrs. Alexander Pirie & Sons, of Aberdeen and London, the well-known paper manufacturers. In dimensions the frontage is 54 ft. in length; the height from the ground line to the top of the parapet is 70 ft.; the mean width of the ground built upon is about 70 ft. The style may, for want of a more precise term, be designated City Classical. The front is of red brick, liberally relieved with cornices, strings, and dressings of Portland stone profusely carved. The front is in three bays with four principal pilasters from the ground to the parapet, where they are crowned with carved vases of Portland stone. The central bay, which includes the principal entrance, is extra enriched. The recessed doorway has a segmental head and a pediment filled in with carved work; over this, between the first and second floors, is a circular window, and, above it, a corbelled semicircular balcony projected from the front of the second floor, all this portion of the building being in stone. At each end of the frontage are pairs of oak ten-panelled doors, the central panel horizontal. These doors are square-headed, as are also the three-light windows, which have mullions and transoms, of the first and second floors; the windows of the third floor have segmental heads; the range of the fourth floor, closely coupled, are semicircular; the fifth floor is lighted by dormer windows, the centre one lofty, in stone-work, and decorated. In addition to the enrichments already referred to, the others are, the cornice and entablature between the ground and first floors, the work in stone between the third and fourth floors, with the principal cornice and parapet. As is usual in warehouse construction, the largest quantity of light possible is provided, and the greater part of the area in the principal elevation is accordingly of polished plate glass.

Internally the construction is, as regards the floors, of iron girders supporting joists 11 in. by 3 in., laid 12 in. apart. The rooms are cased and ceiled with match-boarding, and have 2 in. beads in the angles. One special reason for adopting this style of finishing the walls and ceilings may probably be that Messrs. Pirie are large manufacturers of papers of very high qualities that would be injured by the exhalations from plastered walls. There are two flights of stairs from bottom to top of the building; the treads are of teak, 1½ in. thick, with half-round fronts. The curbed roof is covered with countess slates.

The building has been designed by Mr. George Vickery, architect; Mr. F. Dashwood has acted as clerk of the works, which have been executed by Mr. Laurence, of Wharf-road, City-road, contractor.

## VALUE OF CITY PROPERTY.

Two large buildings, recently erected at the corner of Charterhouse-street and Ely-place, consisting of shops, with suites of offices above, were offered for sale at the Auction Mart, last week, by Messrs. Fox & Bousfield. The property is held under lease from the Corporation for eighty years, at a ground-rent of 120*l.* a year; and it was stated that the annual rental of the shops and offices amounted to 600*l.*, leaving a profit rental of 480*l.* per annum. The auctioneer dwelt upon the great value of property in the immediate locality, and pointed to the fact that almost all the land in the neighbourhood, including the Holborn Viaduct surplus land, was now disposed of and built upon, and that no further leases on ground-rents were to be had. Commencing at 2,000*l.*, the sum of 3,000*l.* was reached for the property, at which it stood, when the auctioneer announced that, although very greatly below its value, it must be sold for the sum offered, if there was no further advance, and none being made, the property was knocked down for 3,000*l.*

## SUBURBAN BUILDING LAND IN THE AUCTION MARKET.

### THE HANWORTH PARK ESTATE.

HANWORTH PARK, situated in the parish of Feltham, on the London and South-Western Railway, and stated to be within about half an hour's ride from the metropolis, is being laid out for building purposes, and about 40 acres of the park, divided into ten lots of building land, were offered for sale by Messrs. Farebrother, Ellis, & Co., on Thursday, the 3rd inst. For the first lot, containing a little over four acres, 1,600*l.* was offered, being at the rate of about 400*l.* per acre. The offer not being accepted the lot was withdrawn, as were also the following lots, for which prices varying from 300*l.* to 400*l.* per acre were offered. The aggregate sum offered for the ten lots was a little over 12,000*l.*

## PRIZES, UNIVERSITY COLLEGE, LONDON.

ARCHITECTURE, Professor T. Hayter Lewis, F.R.I.B.A.—Donaldson silver medal, F. Sanders, of Cheshunt. Prize, B. J. Capell, of Weedon.—*Construction, Senior Class.* Donaldson silver medal, R. E. Smith, of Forest-hill. Prize, F. Sanders, of Cheshunt. Certificates, 3. E. Fertwee, of London; 4. B. J. Capell, of Weedon.—*Junior Class.* Prize, A. B. Cottam, of Watford. Certificates, 2. W. Bisiker, of London; 3. W. J. Lauder, of London.

ENGINEERING AND DRAWING, Professor Alex. B. W. Kennedy, M.I.C.E. (Dean of Science).—*Civil Engineering.* Prize, E. C. J. Devis, of Birmingham. Certificate, 2. C. de Verteuil, of Trinidad.—*Mechanical Engineering.* Prize, H. E. Lockhart, of Blackheath. Certificates, 2*. E. C. J. Devis, of Birmingham; 3, *equal*. A. G. Ashcroft, of London, T. W. Weston, of Coalbrookdale.—*Theory of Machines.* Prize, *equal*, T. W. Weston, of Coalbrookdale, *T. M. Teed*,† of London. Certificates, 3. A. G. Ashcroft, of London; 4. A. S. Vowell, of London.—*Surveying.* Prize, W. G. Nottage, of London. Certificates, 2*. H. J. Porter, of Budleigh Salterton; 3*. *H. W. Teed*, of London; 4. H. P. Thomassett, of Walthamstow; 5, *equal*. H. G. Lange, of Trinidad, *T. T. Prentice*, of London.—*Engineering Drawing.* Second year: prize, T. W. Weston, of Coalbrookdale. Certificates, 2. A. S. Vowell, of London; 3. *T. M. Teed*, of London. Third year: certificates, 1. A. G. Ashcroft, of London; 2. John Buchanan, of Dumbarton.

*Obtained number of marks qualifying for a prize.
†Names printed in italics are those of former pupils of University College School.

## CITY OF LONDON SCHOOL COMPETITION.

ON Tuesday last the meeting to which we have already referred, comprising more than half of the architects who have sent in designs in this competition, was held at the Cannon-street Hotel, when a resolution was unanimously passed that a memorial be presented to the Court of Common Council expressing satisfaction at the course adopted by the committee in exhibiting the designs, and requesting that the Exhibition might be open *for fourteen days at the least*, and also asking the Court that the various designs might be referred to an independent architect to examine and report on before the final award is made. The meeting was very unanimous, and it was strongly felt that some architect of eminence, whose decision the whole of the competitors would be willing loyally to accept, should report on the designs, more especially as this competition might be a precedent for others.

Mr. Jas. Edmeston has given notice that he will move the following resolution at the Court of Common Council:—

"That before proceeding to determine which design for the City of London School shall be selected for execution, all the designs sent in shall be submitted to the President of the Royal Institute of British Architects, who shall report thereon, distinguishing, in their order of merit, those three designs in which the instructions issued by the committee to competitors have been most efficiently carried out, and that the premiums be awarded accordingly. That for this purpose the mottoes be covered over, and the sets of designs merely distinguished by numbers."

## FACTS AS TO THE WATER-SUPPLY QUESTION.

A SILVER medal was awarded by the Society of Arts to Mr. Fredk. Toplis for his paper on "Dividing England and Wales into Watershed Districts," an elaborate essay showing much thought and care. We print a few passages from it which will be found interesting:—

*The Quantity of Water necessary.*

The quantity actually supplied varies in different towns from 10 to 50, or even 100 gallons per head per day, but there is often a considerable waste. The quantity used in cottages is sometimes as low as two gallons per head, when the water has to be fetched, or five gallons when there is a supply close to the cottage. In larger houses, from ten to twenty gallons per head is used. The average consumption of the manufacturing towns of Lancashire and Yorkshire has been stated by Mr. Bateman to be from sixteen to twenty, or twenty-one gallons, for all purposes.

Experiments made show that not more than ten or eleven gallons per head are actually used for domestic purposes, and the majority of the evidence collected on this subject seems to prove that twenty gallons, or at the most twenty-five gallons, per head per day, ought to be enough for all purposes.

The constant system of supply, properly carried out, is greatly preferable to the intermittent, and will soon, no doubt, become universal. Its introduction has in many towns been attended with a decrease in the quantity supplied, but this does not prove that less is usefully used, if the expression might be allowed, with the constant system than with the intermittent system. The reason for the decreased supply is simply that more care is generally taken to inspect the water-mains and the fittings in the houses, and to see that there is no waste of water. Such, however, is not always the case; as, for instance, in London, where the water companies have in some parts introduced the constant system without any alterations being made in the fittings, the result being that there are cisterns overflowing day and night for weeks together, saturating the soil round the houses. It must be remembered that, while the supply for domestic purposes ought to be sufficient, any waste of water is a disadvantage to the householder and to the community. Under a properly-managed system, the rates, where twenty-five gallons per day is supplied, ought to be less than where the supply is fifty gallons; and if in the latter case half is wasted, it is certainly not true economy to provide fifty gallons per head per day. Again, if the water running to waste enters the sewers, it has in many cases to be pumped up again; and if the sewage is used for irrigation, it is unnecessarily diluted by the waste water, and thus rendered less valuable. If the waste water does not enter the sewer, but penetrates the soil, it produces dampness, leading to discomfort and disease.

The use of meters for domestic as well as for manufacturing supply is sometimes advocated, but it seems to the author unnecessary and unadvisable. If there were a proper system of house inspection, and if the inhabitants in a district were made to understand that waste of water would cause increased cost of supply, and, therefore, increased rates, meters would be unnecessary; and, if introduced, might often lead to an undesirable stinting of the water used in a household. The author, in his calculations, has assumed twenty-five gallons per head per day as the supply required, but thinks that it would be found that twenty gallons would be amply sufficient. He wishes to point out, however, that a much larger quantity than twenty-five gallons per head of the present population is available in each district. Assuming the population of England and Wales, when this scheme is put in operation, to be twenty-seven millions, the quantity required will be 675,000,000 gallons per day; and when this population has doubled, the quantity required, at the rate of twenty-five gallons per head per day, will be 1,350 million gallons per day, or 492,750 million gallons,—say 500,000 million gallons,—per annum.

*Quantity of Water available.*

The average rainfall throughout England and Wales is generally stated at 32 in. per annum, giving a total fall in the year of more than 27,000,000 million gallons; of this, the quantity given above, as required for a population of 54 millions, is less than 2 per cent. The direct collection of rain by each household for its own consumption has been advocated, but can only be carried out in country districts; and even there rain-water could scarcely be classed as wholesome or palatable, as is shown by the analyses made for the Rivers Pollution Commissioners. The author thinks, however, that, for the use of farming stock and agricultural machinery, rain-water might and should be collected, and has therefore made no allowance for these purposes in estimating the quantity of water required per annum in England and Wales.

In the mountainous districts of the North-west of England and of Wales the rainfall is greatly in excess of the average, and, as the strata are impermeable, a large proportion of it runs off into the rivers and lakes; and the greater part of this water could be utilised, either by making impounding reservoirs, or by drawing off the water from the existing lakes.

In the central part of England, where the ground is of less elevation, and the rainfall not above the average, there is a very large area covered by the trias or New Red Sandstone formation. The Rivers Pollution Commissioners, referring to this, say that there is every reason to believe that vast quantities of hitherto unutilised water of most excellent quality are to be had, at moderate expense, from this very extensive geological formation. The committee appointed by the British Association state, in their second report, that "the area of New Red Sandstone is not less than 10,000 square miles in England and Wales, with an average rainfall of 30 in., of which never less than 10 in. percolates into the ground, which would give an absorption of 1,433,336,000 gallons per square mile per annum." This, over an area of 10,000 square miles, would give 1,433,360 million gallons, which is nearly three times the whole quantity that will be required for England and Wales when the population has doubled. In their third report, in 1877, the committee state that "there is an available daily supply from the New Red Sandstone and Permian of England of not less than 3,600 million gallons per day, remarkably free from organic impurity."

Further to the east is a band of oolitic strata stretching from the north-east of Yorkshire to the south of Dorsetshire. The Rivers Pollution Commissioners say, with reference to this formation, that "the oolites contain vast volumes of magnificent water stored in their pores and fissures; and again, "that the oolites absorb immense quantities of rain-water," and that "it cannot be doubted that a considerable proportion of this could be secured for domestic supply in its pristine condition of purity."

Further east again are the greensands and the chalk, which contain large bodies of water. In the fourth report of the committee of the British Association it is stated that there are 26,687 square miles of permian, trias, oolite, Hastings sand, greensand, and chalk, yielding subterranean waters. That probably four-fifths of this area would yield unpolluted water, and would receive not less than from 10 in. to 15 in. annually, or a quantity, if 6 in. only were yielded in wells, of 240,000 gallons per day per square mile of surface, and in many districts double this, giving a total in England and Wales far in excess of that required for drinking and manufacturing purposes." 240,000 gallons per square mile over an area of four-fifths of 26,687 square miles, or 21,350 square miles, will give more than 5,000 million gallons per day. The quantity required for a population of 54 millions is given above, as 1,350 million gallons per day.

Further reference will be made to the available supply in giving the details of each district; but enough has been said to show that there need be no difficulty in providing a good and sufficient water supply throughout England and Wales, if only an efficient scheme were arranged for utilising the different sources of supply.

## THE FLOODINGS IN SOUTH LONDON, AND THE HOME SECRETARY.

SANITARY NARRATIVES.

AT an interview which a joint deputation from the Lambeth Vestry and the Wandsworth Board of Works had with the Home Secretary last week, some very grave statements were made as to the increasing evils which are arising from the constantly recurring floods on the south side of the Thames. The object of the deputation was to induce the Government to take some steps in the matter, and ask for the appointment of a Royal Commission to inquire into the alleged inadequacy of the sewers to carry off storm waters.

Sir H. W. Peek, in introducing the deputation, stated that owing to the defective construction of the Main Drainage sewers in the districts of Lambeth and Wandsworth, not only dozens, but hundreds of houses were constantly flooded at nearly every great rainfall.

Amongst the speakers was Mr. Meaden, of Wandsworth, who said the whole matter so greatly affected the health and comfort of a large number of the artisan and labouring classes, besides other people, that they had resolved to do what was possible to bring the matter under the notice of the Government. The floods of which they complained were getting worse every year. In 1877 there were three floods from rainfalls, irrespective of the floods arising from the overflow of the Thames. In 1878 there were in the Wandsworth district 200 houses flooded; in January 1879, 450; in May last about the same number; and a short time ago 440. The medical officer's report on the subject stated that in the parish of Battersea, which had been flooded last January and February, nearly all the inhabitants living in the houses so flooded were more or less affected by diseases likely to result from sewage flooding, such as typhoid fever. The floods also impregnated the houses with deposits of sewage. He added that the Wandsworth Board had taken advice from the Attorney-General and Mr. E. Clarke, who recommended them to apply to the Home Secretary, and they hoped an inquiry would be granted by him.

Several other members of the deputation gave similar instances of the evil effects of floods in the district, and in answer to a question from the Home Secretary, Mr. Meaden said they had had a correspondence with the Metropolitan Board of Works on the subject, but could not obtain any relief. Being himself a member of the Metropolitan Board, he had brought the matter forward many times. It was treated as a matter of expense, but in the Wandsworth district they had carried out local drainage at an expense of 300,000*l.*, and that had been supplemented by about 200,000*l.* more from the private owners and the public rates.

After some further conversation, the Home Secretary said they asked him to make inquiries and to prosecute. He had the power to make inquiry, and to prosecute, if he thought fit. Of course, such a state of things ought not to continue, and in some way or other it ought to be remedied. He should not say more than that at present, but should consider the question.

**Dundee School of Art.**—The annual exhibition of works executed by the students of the Dundee School of Art has been opened. The majority of the exhibitors are day-class pupils; but a few drawings have been contributed by the pupils of the evening class.

## OPENING OF THE BULL POINT LIGHTHOUSE.

THE new Lighthouse which has been erected at Bull Point, Morthoe, North Devon, was publicly lighted for the first time on the last day of June, and the lighthouse opened. The money expended upon the building by the Trinity Board exceeds 7,000*l.*, in addition to the light-lantern and fog-signal. Much discussion and correspondence took place previously to the site being fixed upon, as to whether Morte Stone was not a more suitable spot for the lighthouse. The Trinity Board, however, finally decided that a lighthouse upon Bull Point would not only be less costly, but would be more effective than one upon Morte Stone. The contract was placed in the hands of Mr. R. T. Hookway, builder of Bideford, and he has completed the work some time before the time specified in the contract. The building consists of a block containing dwellings for three keepers and their families, a fog signal-horn, tower, &c.; also an oil-store, general store, piggeries, and offices. The fog-signal, which is a very powerful one, is sounded and worked by a pair of caloric engines, manufactured by Brown & Co., of New York, but fitted up and fixed by the fitters from the Trinity wharf. The lantern and light were manufactured by Messrs. Chance Bros., of Birmingham. The light is of the first magnitude, called a six-wick triple flash-light. The tower of the Bull Point lighthouse is 30 ft. high, and the top of the lantern is about 20 ft. above the tower. There is also a low light which shines through a window of the same tower at a lower level, and throws a red line of light along the the water, clear of the Morte Stone. The whole of the works were officially inspected by Mr. J. N. Douglass, engineer, and Mr. T. Matthews, assistant engineer. Mr. George Francis acted as clerk of the works.

## THE TOWER HIGH-LEVEL BRIDGE AND MR. HENDERSON, C.E.

### THE POPLAR AND GREENWICH STEAM FERRY PROJECT.

AMONGST the witnesses who have just given evidence against the proposed Tower High-Level Bridge is Mr. Henderson, a shipowner, and also a member of the Institution of Civil Engineers. In the course of his evidence, Mr. Henderson incidentally stated that he was about to introduce a steam ferry from Poplar to Greenwich, and that the Thames Conservancy had approved and passed his plans. He said that this ferry was the result of petitions from merchants and other persons interested in having an efficient means of crossing the river for their vehicular traffic. Land had been procured on both sides of the river for the project, and the approaches to this would not have any gradient. He observed that if the Tower Bridge were to cost a million, the interest on which would be 75,000*l.* per annum, he believed two or three efficient steam ferries could be built and maintained for this. He produced a model of his ferry steamer, and also a model of a new patent invention for raising a similar steamer to the level of a wharf, for the purpose of loading and discharging cargoes of vehicles, and which is designed more especially for up-river ferries, and suited to the immediate necessities of the City.

## THE KING'S CROSS THEATRE.

AMONGST the sales at the Auction Mart which have taken place within the last few days, the King's-cross Theatre, in Liverpool-street, nearly opposite to the Great Northern and Midland Railway Stations, has been offered for sale, by order of the mortgagees. Mr. Lumley, the auctioneer, in submitting the property, stated that the theatre, though a small one, had a compact and handsome interior, and would accommodate an audience of about 800 persons. It is held on lease for an unexpired term of twenty-four years, at a ground-rent of 9 guineas per annum, and the auctioneer stated that, independently of the rental derived from it for theatrical purposes, a sum averaging upwards of 50*l.* per annum had been realised on the property during the last few years by letting it for Sunday services. It was described as a fully licensed theatre by the Lord Chamberlain. The sum of 500*l.* was the first offer made, which was increased to 750*l.*, and there being no further advance, the auctioneer said it could not be sold for that sum, and must be withdrawn, as a purchaser was ready to give 1,000*l.* for it by private contract, which was considered below its value.

## A COLOSSAL STEAM LAUNDRY.

A STEAM laundry of unusually large dimensions is at present in course of erection for Messrs. Spiers & Pond, on a plot of ground on the Battersea Park Estate, a short distance on the south side of Battersea Park, and bounded on the south side by Battersea Park-road. The buildings and grounds cover an area of more than an acre in extent. The principal frontage of the building faces the east, and is 170 ft. in length. The central portion of the elevation is 45 ft. in height, and consists of three floors, with a spacious arched entrance to a large court-yard. This entrance is 10 ft. in width, and 15 ft. in height. What may be termed the wings on each side of the central portion of the elevation have two floors, the whole presenting an imposing frontage. Other blocks, each containing one lofty floor, are erected on the north, south, and west sides respectively, being carried to a depth westward, extending to about the centre of the site, the remaining space on the extreme west side being set apart as a drying-ground, with a separate block at the south-west corner containing the stables. In close proximity to this block stands the engine and boiler house, having a chimney-shaft 70 ft. in height, 7 ft. wide at the base, and 4 ft. at the top. This portion of the building will be fitted with engines and boilers of sufficient power to drive all the machinery required in the various processes of the laundry. A boundary-wall, 7 ft. in height, encloses the buildings and grounds. The materials of the building are yellow brick, with stone window-sills, and Beart's white moulded brick for string courses, window-jambs, arches, and cornices.

The main block on the east side will contain, in the centre, the manager's residence, with clerks' and other offices, whilst another portion of the block will contain a spacious mess-room for the *employées*, together with a bath-room and other domestic conveniences. The blocks forming the laundry proper are those on the north, south, and west sides, and contain on the south side a sorting-room for the reception of articles as they are brought in by the vans. This apartment is 63 ft. in length by 18 ft. in width. Immediately adjoining it is the washing-room, 50 ft. square, with large open louvres in the ceiling for ventilation and the escape of steam. Adjacent to this is the drying-room, 70 ft. by 30 ft. The folding-room and the mangling-room are in the west block, their dimensions being respectively 40 ft. by 30 ft., and 52 ft. by 30 ft. The ironing-room and the packing-room are in the north block. The dimensions of the former are 55 ft. by 25 ft., and of the latter, 40 ft. by 25 ft. As regards the drying-room, it should be stated that in the construction of the building a plan has been carried out by which a flue-pipe, 70 ft. in length, is carried from the boiler, horizontally, immediately along the floor of the drying-room, for the purpose of being utilised in the drying process.

The buildings and works have been designed by Mr. Kemp, architectural engineer. The contractor is Mr. Priddle, of Hounslow; and the building is being carried out under the superintendence of Mr. Warburton, as clerk of works, who also acted in a similar capacity during the erection of the Gaiety Restaurant. The estimated cost of the building and machinery is about 12,000*l.*

**Coffee Taverns.** — The Anchor Coffee Tavern, the first establishment connected with the Kilburn Coffee Tavern Company, has been formally opened by the Hon. W. Cowper-Temple. It is situated in the High-road, at the junction of Cambridge-road and Canterbury-road. Mr. Joseph Peters (chairman of the company), in introducing Mr. Cowper-Temple, said,—Had the people seen the premises a few weeks before, they would agree with him in the statement that a wonderful deal of work had been got through in a short time. He felt that their thanks were due to their efficient architect, Mr. Heffer; to their energetic contractor, Mr. Dainton; and to the others who had helped to bring about this result. Mr. Cowper-Temple made an agreeable address, and a considerable amount of business is now being done on the premises.

## NEW PAROCHIAL INFIRMARY FOR MARYLEBONE.

THE foundation-stone of a new infirmary for the parish of St. Marylebone was laid on Monday by Mr. Edmund Boulnois, the chairman of the Board of Guardians. The site is just off Ladbroke-grove-road, Notting-hill, and is a parallelogram in shape, with its longest sides having frontages to Rackham-street and Treverton-street. The building is being erected by the Guardians, in pursuance of the provisions of the Metropolitan Poor Act, 1867, and under the orders of the Local Government Board. It will contain accommodation for the care and treatment of 760 of the sick poor of the parish. The architects are Messrs. Saxon Snell & Son. A contract has been entered into with Messrs. Wall Bros. for the erection of the building, with all its fittings and engineering works, for 109,000*l.*, and it is anticipated that the total cost, including the price paid for the land and the furniture and fittings, will be at the rate of about 160*l.* per bed.

## THE OPERATION OF THE ARTISANS' DWELLINGS ACT.

### METROPOLITAN BOARD OF WORKS.

AT the meeting of the Metropolitan Board of Works on the 4th inst., the clerk read the following report of the Works and General Purposes Committee:—

"Your committee, under the authority of the general reference by the Board of the 4th October last, with regard to the Whitechapel and Limehouse Artisans' Dwellings Improvement Scheme, have had under consideration a letter, dated the 26th May, 1879, from the trustees of the Peabody Donation Fund, submitting an offer for the portion of land which has been cleared within that area, and also for the sites comprised in the following schemes, namely, Bedfordbury, Great Wild-street, Pear-tree-court, Whitecross-street, and Old Pye-street. The terms and conditions of the offer are as follow:—

That the sum to be paid for the portion of the Whitechapel and Limehouse site be 10,000*l.*; that the remaining sites be taken from time to time, as they are cleared, at a price, based upon threepence per superficial foot, as rent at twenty years' purchase; that each site be paid for one year after it is cleared and in the hands of the trustees. The letter further stipulates that the offer shall be subject to the terms of a contract to be agreed upon, and concludes with the statement that the purchase will involve an outlay on the part of the trustees of about 120,000*l.* for land, and 500,000*l.* for buildings.

Before proceeding to state their views upon this offer, your committee think it well to refer to the steps which have been taken with regard to the portion of land comprised in the Whitechapel and Limehouse scheme. This, as the Board are aware, was cleared in the course of last year, and was, after the form of tender and conditions had been approved by the Home Secretary, freely advertised to be let for the purposes contemplated by the Act. No offers, however, were received for the land, and it being understood that some of the conditions of letting were considered objectionable, your committee subsequently instructed your solicitor to communicate with the counsel of the Home Department, and also with the officers of the companies who require land of this description, with a view to an alteration of the conditions, and in the result certain modifications were agreed to by the Board, and afterwards approved by the Home Secretary. Further advertisements were then issued, inviting tenders upon the modified conditions of letting, but still no offers were received, and ultimately your committee came to the determination to submit the land to public auction. It was accordingly offered at the Auction Mart on the 12th inst., but on that occasion not a single bid was made for it. Under these circumstances it became the duty of your committee to carefully review the position of the matter, and, the offer of the trustees of the Peabody Donation Fund having in the meantime been received, they instructed the Architect of the Board to make a report to them thereon. The Architect accordingly prepared and presented a report, which your committee submit herewith, and a print of which has already been furnished to each member of the Board. From this it will be seen that the loss to the Board, if the offer of the trustees be accepted, is estimated at the large amount of 643,461*l.*, subject, however, to a reduction by about 81,400*l.*, the value of the recoupment area not set apart for Artisans' Dwellings, which the Board will retain. It will also be seen that the Architect estimates the value of the sites, assuming that the whole of them were dealt with by the trustees, at an average price of 4d. per superficial foot computed at twenty-two years' purchase, and states that, at this rate, the loss to the Board would be 509,090*l.* upon the six areas. It further appears from the report of the architect that if the Board were in a position to obtain the commercial value of the various sites, the loss would be reduced to the sum of 238,072*l.*

Upon receiving this report, it seemed to your committee that the proper course would be to place the architect in negotiation with the advisers of the trustees, with a view of ascertaining whether they would be willing to increase their offer to the estimate above mentioned, namely, twenty-two years' purchase upon a rental of 4d. per superficial foot, and this was accordingly done.

A letter was subsequently received from the Earl of Derby, the chairman of the trust, which your committee also submit, explaining the position of the trustees in the matter, and the reasons which had influenced them in applying for the land, and intimating that if objection were taken to the terms offered as being unduly favourable to the purchasers, they would retire without regret from an undertaking on which they had entered solely from considerations of public utility.

Under these circumstances, and after a careful considera-

tion of the whole of the facts above set forth, it appears to your committee that the time has arrived when the Board should finally decide as to the terms upon which this land shall be disposed of. They greatly regret that the endeavours which have been made to obtain what seems to them a moderate estimate of its value should have been unsuccessful, and that so serious a financial loss should be entailed upon the ratepayers of the metropolis. But it must be borne in mind that the present offer deals with several areas, and that any further delay would, judging from the length of time during which the Whitechapel land has been vacant, in all probability involve a still greater loss. It appears reasonable to assume that as each site is cleared similar difficulties would be experienced in the disposal of it, and your committee are of opinion, therefore, that the only course which the Board can be advised to take is to accept the offer which they now present. Your committee accordingly recommend:—

That the offer contained in the letter of the trustees of the Peabody Donation Fund, dated the 26th of May, 1879, be accepted on the terms and conditions stated in such letter."

Mr. E. Dresser-Rogers, in proposing the reception and adoption of the report, observed that immediately after the passing of Mr. Cross's Act, something like thirty or thirty-one schemes were proposed to the Board. The Board most honestly and most earnestly endeavoured in every possible way to carry out the Act. Having acquired the sites of the unhealthy areas in question, the Board obtained from two or three sources offers for the purchase of the land which were not accepted, and after taking other means to obtain better offers, found itself at a dead-lock on the subject. The trustees of the Peabody Donation Fund had now made an offer for the purchase of some of this land, but on the first blush of the matter that offer seemed so low that most members were disposed to think that the Board could not possibly accept it. But when they came to look into the question fully, the majority of the Works Committee came to the conclusion that the Board would do well to accept the offer. The Legislature having referred this Act to the Board to carry out, it had placed the Board in the position of not being able to refuse this offer so long as they had no better offer before them, and although the loss to the ratepayers would be enormous in consequence, he thought the Board would see that it had no alternative but to adopt the course suggested by the committee.

Mr. Fowler much regretted that he could not approve of the decision of the committee. The aggregate cost to the Board of the schemes now before them had worked out, so the Architect had advised them, including all interests, at about 80,000*l.* per acre, and the proposal of the committee was that they should accept this offer of the Peabody trustees of 3d. per foot, or 10,000*l.* per acre. In other words, for every acre of land dealt with under this Act, the Board was called upon to sacrifice on behalf of the ratepayers no less than 70,000*l.* This was a state of things which, in his opinion, was never contemplated by the Legislature, and to which he thought the Board should not readily submit. The Board had had before them some thirty-one schemes under the Act, and of these thirteen had been confirmed by the Home Secretary. Of the thirteen they were now dealing with six, but taking the other seven, the Architect had estimated that disposing of the land at this price of 3d. per foot the loss would be 514,000*l.* Then there was the remainder of the thirty-one schemes, and if the whole of these were to be dealt with in the same way, the loss to the ratepayers would be between two and three millions sterling. He contended that under the Act the Board was not called upon to make such a woeful sacrifice of the funds of the ratepayers. It appeared to him that a certain portion of these sites might be used for shops, the ground-floors, for instance, and the upper stories as dwellings. By the carrying out of such an idea as this he was of opinion that the cost to be borne by the ratepayers would be considerably lessened. However, before committing itself to the adoption of the proposal of the committee, he thought the Board should appeal to the Home Secretary, and with this view he proposed the following amendment:—

"That the offer of the trustees of the Peabody Donation Fund be not accepted, and that the Board do lay before the Home Secretary a statement of the cost of acquiring the properties for the six improvement schemes and of the action taken by the Board in endeavouring to dispose of the land, and do point out to the Home Secretary the necessity for some amendment of the law so that the object of the Act may be obtained without entailing such a ruinous loss on the ratepayers."

Mr. C. Legg seconded the amendment, and after a long debate, the Board divided, when there appeared,—for the amendment, 10; against, 24. The amendment was, therefore, lost, and the motion for the adoption of the report, on being put, was declared carried.

## DISPARITY IN TENDERS FOR PAINTING AND DECORATION.

SIR,—The constant and often excessive disparity that occurs in tenders for painting and decorative work, and the comments thereon that are found in print, prompt me to address a few words to you upon this very important subject.

The public, when reading of such cases in your weekly list of tenders, are prone to remark, "If the lowest competitor can execute the work for that sum, what an inordinate profit must those competitors require who perhaps ask double the amount."

Now, the causes that create these disparities are chiefly as follow:—

1. The absence of surveyor's quantities, or the measurement in detail of the several surfaces to be dealt with.

2. The wide difference in the estimating capacity of the firms competing.

3. The also wide difference in the ability of the heads of firms, also of the capacities of their staff, quality of workmen, &c.

4. The occasionally very open character in the descriptions of the specifications.

To consider these points *seriatim*.

1. The absence of surveyors' quantities is invariably found to exist where these disparities occur, which proves that surveyors' quantities are the greatest requisite to ensure sound and dependable tendering, and the greatest preventive against unreasonable and sensational estimates.

2. The wide difference in the estimating capacity of firms.

In cases where "quantities are not supplied," the tradesman has three courses open to him:—

A. Either by his estimating clerk or himself measuring the work and pricing it.

B. If not qualified himself to measure work, and not possessing an estimating clerk, to employ a surveyor to do it for him.

C. If not adopting either of the foregoing courses, to walk over the building and form an opinion by making a guess. Now, unfortunately, it is the fact that firms possessing good measuring and pricing ability as estimators, are constantly pitted against other firms of lesser calibre, who have no such qualifications, and, as the object of each competitor is naturally to get the job, the result is that the guesser is usually far below rather than above the mark.

3. The wide difference in the ability of the heads of firms, the capacities of their staff, and quality of the workmen.

It is an incontrovertible fact, that a man may spend both time and money to educate himself to the standard of what a master decorator really ought to be; he may become an ornamentist of a high order as regards form, a grammatist in colour, a scientist in the use and nature of pigments, a man of taste and discrimination from experience; he may accumulate and educate a highly-qualified staff around him, employ the best quality of labour, and execute thoroughly good work at a most reasonable cost; and yet constantly be placed in competition with another calling himself a decorator, who possesses neither knowledge nor staff nor high-class labour, and whose powers of production as regards really good work are positively *nil*.

It may be asked, why the man firstly described does not refuse to compete with his inferior in business production? But the answer is, that competitors seldom know against whom they are competing, and consequently often waste time and money in preparing estimates; whereas, had they known against whom they were in competition, they would have saved time and trouble by a refusal.

4. The very open and indefinite character of the specifications for decorative work.

This, I may observe, is not necessarily the fault of the architect, inasmuch as the client might not have sufficiently decided views of what he required, or the architect might like to a certain extent to leave it open to the skill of the decorator to see what his taste could produce, or many other reasons; but be that as it may, these open descriptions in specifications cause many of the disparities we find in competitive estimates.

I will give two examples of indefinite description which will do for many.

It has often been my experience to be called upon to price the decoration of a cornice from the wording, "and to pick out the enrichments and mouldings in colours and gold"; thus, in this instance, one might say, "I consider two enrichments gilded will be plenty," while, on the other hand, the other might not consider four sufficient.

Again, the words "to suitably decorate with lines and stencil decoration, in colours and gold," are often met with, with reference either to ceilings or panels of woodwork, &c. For this one competitor might consider an outlay of 5*l.* was intended, and another might equally rightly suppose 10*l.* would barely suffice.

From a careful consideration of the foregoing facts, I would suggest, as a preventive of disparity in tendering, and in the interests of sound tendering and encouragement of good work at a possible price:—

1. That quantities should invariably be supplied as a basis for calculation wherever possible.

2. That firms be invited to compete who are of the same comparative standing as regards the production of work and the character of labour employed.

3. That where quantities are not supplied that the specification be most scrupulously definite, as, for example, in the quoted instance of the cornice; although each member could not separately be described, still the given number of members gilded and those cut in in colour could be quoted, so that an estimator may be guided as to how many he may take for in gold or colour as regards fixing cost, leaving their relative and separate treatment to be individually settled afterwards.

I trust these few remarks will lead architects, surveyors, and the trade to give the subject their serious consideration, for the advantage not only of themselves, but also of the public.

ONE WHO IS NOT AFRAID OF FAIR COMPETITION.

## MR. G. CAVENDISH BENTINCK AND VANDALISTIC "RESTORATIONS."

SIR,—The Right Hon. the Judge-Advocate-General seems to have spoken with characteristic bluntness at the meeting of the Society for the Protection of Ancient Buildings (reported in last week's *Builder*) as to what he deems the inconsistency of certain members of the Royal Institute of British Architects in permitting or committing acts of Vandalistic "restoration." Mr. Cavendish-Bentinck is himself an "Honorary Associate" of the Institute, and no doubt he spoke with a due sense of his own sins of commission, if credence may be given to an article in the *Dorset County Express* of the 1st inst., which journal, after stating that the right hon. gentleman is the owner of Branksea Island, says:—

"Branksea Castle is also owned by Mr. Bentinck, but he does not reside in it; his reverence for the ancient pile, or, at least, the ancient part thereof, fell to zero when he pulled it down, and all that is now left of what was once Branksea Castle is an empty, desolate building, where owls, bats, and mosquitoes can pursue their flight in peace. Various ornaments of value which once adorned the castle are now removed. The bare walls of the banqueting saloon, where costly tapestries formerly hung, lead one to picture what that noble room once was, whilst the blank and vacant space where one of the most beautiful pieces of modern stained glass ever executed served as a window, makes every one who is 'shown round' wonder how so lovely a piece of art could have been sold for a fraction of its value to a Weymouth solicitor by a gentleman with means as large as its former owners."

Possibly Mr. Bentinck may have a good answer to what is implied by the foregoing paragraph.

DELTA.

## INDUSTRIAL DWELLINGS AND THE DEATH-RATE.

SIR,—In your last week's impression I find a paragraph under the above heading, in which it is stated, with reference to the Newcastle Improved Industrial Dwellings Company, that during the eight years their block of dwellings has been open, the average death-rate in them has not exceeded 12 per 1,000; whilst during the same period the average death-rate of the town generally has varied from 29 to 22 per 1,000; that of the neighbouring district of Pandon being even much higher. Now, if such a statement be correct, and I have little doubt that it is, I think you would confer a great benefit on the public at large, if you made known what are the plans and mode of arrangement of the dwellings which have produced such favourable results; for I fear that in many of the so-called Industrial Dwellings that have been recently erected in London, the mortality is nothing like so low as it should be. As for several years to come vast sums of money are

likely to be expended in the erection of Artisans' and Labourers' Dwellings, it is of the greatest importance that the best plans procurable should be adopted. Our Home Secretary is fully aware of the requirements of a healthy home; for at the opening of the Parkes Museum a few days since, he very justly observed that the causes of many diseases were preventible, and that what was wanted was to restore the actual birthright of every citizen,—pure light, pure air, and pure water. He also remarked that there were thousands of people who live in crowded places, such as few of his hearers would venture to go into, and that if obliged to live in them for a week they would hardly come out alive. Under the Artisans and Labourers' Dwellings Act Mr. Cross has to decide upon the class of home that shall be provided for the masses, and therefore I am in hopes that, with the able assistance of the Metropolitan Board of Works, we shall soon see blocks of dwellings erected after the best and most approved plans, and such as will not only meet the necessities of the labouring classes, but be a credit to all concerned.

MATTHEW ALLEN.

## PLANS OF FARM BUILDINGS AT THE AGRICULTURAL SHOW.

WE referred last week, in our notice of the Agricultural Show at Kilburn, to the fact that a building was set apart for the exhibition of plans of farm buildings.

In Class I. (Buildings for Arable Farms above 300 acres) a prize of 50*l.* was offered. Twenty-four sets of plans were submitted. Four sets were selected as "worthy of commendation," viz., those submitted by Mr. Richard Waite, of Duffield, Derby (motto "Colonicus"); Mr. A. Dudley Clarke, of Simdorne, Shrewsbury ("Practice with Economy"); Messrs. W. J. & W. J. Moscrop, of Stockton-on-Tees ("Utility" 2); and Mr. J. E. Watson, F.R.I.B.A., of Newcastle-on-Tyne ("Experientia").

In Class II. (Buildings for Arable Farms not exceeding 300 acres), a prize of the same value was offered. Twenty sets of designs were submitted. Two sets were selected as "worthy of commendation," viz., those submitted by Messrs. C. & J. Cadle, of Gloucester ("The eye of the master is necessary to the due economy of labour"); and Mr. F. E. Walker, of Scole, Norfolk) "Per Mare per Terram.")

In Class III. (Buildings for Dairy Farms above 100 acres), a prize of 50*l.* was also offered for the best set of plans. Fourteen sets were submitted, that by Mr. W. A. Keates, of Hanley, Staffordshire ("Cheddar"), being selected as "worthy of high commendation."

In Class IV. (Buildings for Dairy Farms not exceeding 100 acres), a prize of the same value was offered. Ten sets of designs were submitted, but none of them were selected as worthy of commendation.

The list which has been issued of the authors' names and mottoes of the sixty-eight sets of designs submitted notifies which of the plans have been selected as "worthy of commendation," or "worthy of high commendation," but does not inform us which of the designs selected for commendation have carried off the 50*l.* prizes. Can it be that no prizes are to be awarded?

## FARM PLANS AT THE KILBURN SHOW.

SIR,—The remarks made by a correspondent in the *Builder* for August 3rd, 1872, when the Royal Agricultural Society obtained fifty-two plans for labourers' cottages, and awarded no prize, that "surely out of fifty-two designs there must have been one possessing well-distributed plans," might be fitly repeated with regard to the sixty-eight designs sent in for the farm buildings competition.

Whether keeping these drawings locked up till the fourth day of the Show, and in the meantime affording no information when they were likely to be "on view," and at last making them the only class of exhibit in the Show that has not been awarded any prize, is being treated royally, must depend in a measure upon the merits of the plans themselves; but I suggest that even if the plans were not perfect (and when are plans?), the prizes offered should be awarded to those the judges think best, in the same way as they are given for stock and implements, not because either have arrived at perfection, but because they are the best that have been offered in competition.

I observe that several well-known architects were among the competitors, and others represent the best buildings undoubtedly on some of the largest landed estates in the country. Clearly, then, there is something wrong somewhere.

BOWLED OUT.

## SALEM CHAPEL, DEAN STREET, SOHO.

SIR,—Observing that one of the few now remaining old London chapels, namely, the above, was advertised to be sold by auction a few days ago, I was induced to revisit the building, previously to its possible "conversion into manufacturing or other trade premises," as suggested by the printed particulars. There is nothing much that is architecturally interesting about the place, but it is of large area, well proportioned, and with ample and conveniently-planned accessories. The principal entrance (from Meard's-court) was closed, but there was another available entrance at the back, leading through a small lobby direct into the larger vestry. In this were one or two remains of the old furniture, but the *sacred* look had altogether vanished, inasmuch as, to all intents and purposes, this vestry, and the smaller one adjoining, presented the appearance of ordinary dwelling-rooms, kitchen, &c., being filled with the usual domestic appurtenances. But this was only a mild preparation for the surprise created when the attendant who showed the place, and who said she had known it, on and off, for more than thirty years, threw open the door communicating with the chapel itself. It will scarcely be credited that, intermixed with pews, galleries, pulpit, hymn-books, &c., was a labyrinth of *clothes-lines*, stretched across in all directions from the different vantage-points, and liberally besprinkled (as I may say) with the usual results of the washing-tub hanging up to dry, and peopling the place, as it were, with ghostly forms. Laundry *versus* chapel "Oh, it comes handy for *that*," was the ready answer to an expostulation. "To what base uses may we come at last."

J. D. W.

## BUILDING ACT PROVISIONS.

### PARGETING FLUES.

SIR,—With reference to the case, Jennings *v.* Duncan, under the above heading, in last week's *Builder*, would some correspondent explain how it is, if the appellant's contention that the exterior surface of every flue towards the room must be pargeted, or rendered, as well as the interior, that the portion of the wall between the ceiling and floor is not customarily so treated?

W. G.

*** If it is not customarily so treated it should be; also where the wooden strings of stairs are placed against the outside of a flue, as is constantly the case; and even more especially in the roof between the ceiling of the topmost floor and the slates or other covering. The disregard of this provision would be full of evil.

## THE PROFESSION.

MR. P. G. SMITH begs to enclose an extract from the *Weekly Notes*, June 28th. It is from a list of persons who have applied for liquidation by arrangement with their creditors, and probably appeared in the *London Gazette*, 24th June last:—"Richard Williams, architect and outdoor beerseller, stone merchant and contractor." It seems to show more than ever that there are architects *and* architects.

## SUICIDAL RECKLESSNESS OF WORKMEN WITH THEIR PIPES.

YEAR after year explosions of mines take place, the origin of which can be traced to the lucifer match used for lighting the workmen's "cuttys," or the unlocking of the Davy lamps to the like end. A case in point is the recent explosion at the High Blantyre Colliery, Hamilton, N.B., when the deaths of twenty-eight men were added to the 123 lives lost at the same pit two years since. In the hand of one of the suicides was found the tobacco-pipe, and upon removing the body there dropped from his pocket a false key which opened any of the Davy safety-lamps. After this discovery the police made a stricter search of the dead bodies, and in the pockets of nearly every one of the twenty-eight, pipes and matches were found, and three keys that could open the Davy lamps. On one body two nails were found made into a picklock that would open and lock every Davy lamp in the mine; and had the whole of the men been searched, the police are of opinion that nearly every man and boy who escaped the explosion were alike provided with their implements of destruction.

As recently as a fortnight since, one John Maclean, working at the same mine, was tried before the sheriff at Hamilton for unlocking his safety-lamp while at work in order to light his pipe, and this was in the same shaft where the explosion and loss of life occurred in 1877. The reckless fool was called on to pay the full penalty or have three months' imprisonment.

The writer of this well remembers, upon the occasion of a conference at the Society of Arts, Sir Humphrey Davy remarking that he left his lamp in the hands of mechanicians to invent a fastening that none but a master-key could open. Surely it is possible to devise a lock and key that would prevent the miners tampering with their Davys. At present, in the hands of reckless men, it is a misnomer to call it a safety-lamp. On the other hand, legislative measures should make it a penal offence to carry lucifer matches into a pit.

## BRICKS IN SINGAPORE.

BRICKS are much wanted just now, and their high price seriously retards building operations. According to the *Singapore Auction Gazette*, the price of small native hand-made at present is about $45 per laxa, while they have been known as low as $10, and a fair average price is $28 to $30. Bricks such as those used in the new Town-hall cost $85 per laxa, and contractors are now asking as high as $92. Both Government and native bricks are made by hand, which somewhat accounts for the miserable articles produced, especially the latter. They neither stand sun nor rain, nor last any time, as may be seen on the 5-foot way on Collyer Quay or Commercial-square. The whole machinery for brickmaking by steam could be set up at an expense of $2 to $3,000, and it is extraordinary that no enterprising person has attempted a manufacture of this kind ere this. The clay on the Balestier plain is of the best description for brick-making, and is close to the Kallang river, so that they might be conveyed away at a small cost; besides, bricks made by steam-power are acknowledged to be better in every way than hand-made, and can be produced at a much less cost. There are in the market some old works on the Balestier plain, where the very best clay is to be found, and where no expense in making foundations would be required. We would recommend any one who has an idea of starting such an enterprise as we have suggested to inspect the part of the country to which we allude.

## SCHOOL-BOARD SCHOOLS.

*Hexham.*—Her Majesty's inspector, having complained of the accommodation and condition of the schools handed over to the School Board, Mr. Thomas Oliver, architect, Newcastle-on-Tyne, was called in to report and prepare plans for their improvement. The alterations and additions proposed have been approved by the Education Department, and the works will be commenced forthwith.

*London.*—Sir Charles Reed, chairman of the School Board for London, recently opened the new Board School in Graystoke-place, Fetter-lane. This is the first school erected by the Board within the City boundaries. It is built to accommodate 436 children, and its cost has been relatively much greater per head than schools erected by the Board in the suburban districts. The site cost 8,698*l.*, or 20*l.* per head, and the building cost 6,859*l.*, or 15*l.* 14*s.* per head, making a total cost per head of 35*l.* 14*s.*——A new Board School in Portobello-road, Notting-hill, has been opened by the London School Board. It will accommodate 180 boys, 180 girls, and 227 infants, making a total of 587 children. The site has cost 1,600*l.*, and the building has cost 7,000*l.*, making a total of 8,600*l.* Mr. E. R. Robson is the architect of both schools.

**The Grand Portal of Strasbourg Cathedral**, according to the *Parisian*, is at last finished. The two doors of bronze consist of 1,500 pieces, 650 ornamental-headed nails, 300 rosettes, 98 large lozenge-shaped plates, 14 large figure scenes, 14 half-lozenges with animals, 181 lozenges with plants and foliage, and so forth. The subjects are, of course, from sacred history.

## DEVONPORT PUBLIC HALL COMPETITION.

THE Directors having received eighteen designs in competition for this building, engaged the services of Mr. Grüning, of Gresham House, as professional assessor to aid them in making a final selection. Acting upon his report, the first premium has been awarded to the design under motto "Con Amore," by Mr. Samuel Knight, of Cornhill; and the second to "Tamar," by Mr. Moorshead, of Devonport.

We understand Mr. Knight has since received instructions from the Directors to take the necessary steps with a view to carrying his plans into execution.

The selected design is in the Classic style, and comprises a large hall, to seat,—with balcony and gallery,—over 2,000 persons, specially planned also to be adapted for theatrical performances.

## PREMIUMS OF THE INSTITUTION OF CIVIL ENGINEERS.

THE Council have awarded the following premiums in respect of original communications submitted during the session 1878-79, for papers read at the ordinary meetings:—

1. A Watt Medal and a Telford Premium to G. F. Deacon, for his paper on "Street Carriage-way Pavements."
2. A Telford Medal and a Telford Premium to J. Bower Mackenzie, for paper on the "Avonmouth Dock."
3. A Watt Medal and a Telford Premium to J. N. Douglass, for paper on the "Electric Light applied to Lighthouse Illumination."
4. A Telford Medal and a Telford Premium to A. Fettiplace Blandy, for paper on "Dock Gates."
5. A Telford Premium to Edward Dobson, for paper on the "Geelong Water Supply, Victoria."
6. A Telford Premium to James Price, for paper on "Movable Bridges."
7. A Telford Premium to J. Evelyn Williams, for paper on the "Whitehaven Harbour and Dock Works."
8. The Manby Premium to J. Purser Griffith, for paper on the "Improvement of the Bar of Dublin Harbour."

## CHURCH-BUILDING NEWS.

*Little Leigh.*—On the 19th ult. the new church of St. Michael and All Angels, Little Leigh, was consecrated by the Bishop of Chester. The new church stands near the site occupied by the old one, Lord Leigh having given land for the enlargement of the burial-ground and for the edifice itself. The church is in the Early English style, and consists of a nave, choir, chancel, and north transept. The walls are faced externally with the best Northwich facing bricks, with ornamental cornices, strings, &c., and terra-cotta dressings. The entrance to the church is through a deeply-recessed doorway or porch at the south-west corner of the building, which leads directly into the nave. The chancel is lighted by a circular window, executed in terra cotta, beneath which, and over the communion-table, is a reredos, composed entirely of brick and terra-cotta, the principal feature of which is a representation of Leonardo da Vinci's celebrated picture of the Lord's Supper. The whole of the works have been carried out by the contractor, Mr. Richard Beckett, of Hartford, from the designs and under the personal superintendence of the architect, Mr. Edmund Kirby, Liverpool.

*St. Mary Tavy.*—St. Mary Tavy parish church, Devonshire, has been re-opened after restoration. The church is of the Early Perpendicular period. A general reconstruction of the building has taken place, though many features in the old fabric have been preserved. The contractor was Mr. P. Blowey, of Buckland. Mr. J. P. St. Aubyn is the architect. The entire cost will be about 1,300*l.* or 1,400*l.* The belfry has five bells, and the tenor bell has been recast by Messrs. Warner, of London. The whole of the gear has been put in thorough repair, and a chiming apparatus added by Messrs. Hooper & Stokes, of Woodbury. The screen which divides the belfry from the church is of pitch-pine, fitted with opaque glass, by Messrs. Fouracre & Son, of Stonehouse, who have also glazed the whole of the windows with cathedral-tinted glass. Rimington's apparatus for warming with hot air has been provided. The chancel is paved with Maw's encaustic tiles. The seats, which will accommodate from 100 to 150 persons, are open and made of pitch-pine, varnished.

*Moor Monkton.*—The parish church of Moor Monkton, near York, has been re-opened by the Archbishop of York, after restoration. The whole of the work has been carried out by Messrs. Keswick & Sons, contractors, York; Mr. James Fowler, of Louth, being the architect. The cost has been 1,600*l.* During the last few years the church was found in such a tumble-down condition that it was entirely unfit for public worship. It was, therefore, resolved to have it completely restored. The church is now capable of accommodating 200 worshippers. Everything belonging to the church has been utilised as far as practicable, and it is stated that interference with the ancient design and remains of the seventeenth-century architecture has been studiously avoided by the architect. The chancel fittings have been made from the remains of the ancient sittings; the communion-rails of Archbishop Laud's time have been retained and restored; the seventeenth-century roof has been retained, and the other parts of the building have been made to harmonise. The north wall of the nave has been entirely rebuilt, and the south wall has been retained and restored. The fittings of the nave are entirely new, and of pitch pine. The pulpit is of Caen stone, with marble columns. The aisle and the space in front of the communion-rails are laid with coloured tiles from Minton & Co., Stoke. The font is of the original Norman, subjected to alteration in the seventeenth century.

## VARIORUM.

A NEW edition has been published by Mr. Murray of Mr. Samuel Smiles's delightful and valuable little book "Industrial Biography." Besides various alterations in the present edition, an appendix has been added containing further information as to metal implements, Babbage's Calculating Machine, and other matters. No one can read this book without advantage.——"The Municipal Corporations Companion, Diary, Directory, and Year Book of Statistics for 1879" (Waterlow & Sons), contains such an amount of information as to render it indispensable to all who have to do with municipal matters. It does credit to its editor, Mr. J. R. Somers Vine.——As to the "Ventilation and Heating of Schools," the *Lancet* says,—"The question of the heating and ventilation of schools is of great importance, and one which, we fear, is too much neglected in this country. The usual plan adopted is the use of fireplaces arranged either round the sides of the room or in its centre. In some schools hot air or water pipes are used, and in a few hot air is introduced by pulsion, which sends to the classes an uninterrupted current of heated air. Each system has its advantages, open fireplaces being most suitable for medium-sized class-rooms, hot-air pipes for small studies, whilst the system of heating and ventilating by pulsion is most suitable for large school-rooms ranged on the same floor. Unfortunately, very little attention is paid to the suitability of the different systems to the requirements of the building, and so mistakes which are costly to rectify are not unfrequently committed. In a report recently made to the magistrates of Berlin of the arrangements for the heating and ventilating of the schools of that city, the points that the committee consider of most importance are—constancy of temperature and its regular distribution, the power of regulating the temperature in each class-room independently of the others, and the necessity that the hot air introduced should be freed from impurities by previous filtration through water. They believe these points are best secured by a system of central heating by means of a water-heating arrangement in connexion with ventilation by pulsion. The combination of the water-heating arrangement with the system of ventilation by pulsion is absolutely necessary if the class-rooms are widely distributed or on different levels. Nor can too great stress be laid on the efficient filtration of air from particles of dust. The effect of heated air loaded with particles of dust, much of which consists of organic matter in a state of decomposition, driven into the class-rooms at great velocity, is most injurious to the health of teachers and pupils."——The *Engineer* speaks plainly and properly as to the Royal Agricultural Society's bungle at Kilburn:—"A story is narrated of a nobleman who, on arriving at a station, found that his train had gone, and who, upon being told as much, turned to the station-master and desired him to 'bring another.' This is the plan which has been pursued in the show-yard. It was found that four horses could not move a wagon containing, perhaps, two tons of machinery, thereupon some one told some one else to 'bring more horses,' and they were brought, to the number of, perhaps, fifteen, and after half an hour's work the wagon was drawn fifty yards and left with the wheels, by no figure of speech, but in sober reality, axle deep. Then, as nothing more could be done, the horses were taken away to another wagon not yet quite buried, and having accomplished its interment, they proceeded to another, and so on. The result was that the outlet from the sleeper road to which we have before referred, was literally blocked up with half-buried vehicles. No spectacle of the kind has ever before been seen, apart from an English army on the march. Every exhibitor was left to his own resources. Now, had an engineer, or even any person endowed with sufficient authority, and possessed of sufficient intelligence, been told off for the duty, he would have provided a timber-road, with certain branch roads up the yard, to be made with short planks laid end to end, and over these the wagons would have proceeded easily enough. Once off the branch road, each wagon should have been provided with enough planks to make a track, the planks being laid down in front and taken up behind. The outlay for timber and labour would probably have reached 500*l.* at most, and much of this would have been cheerfully defrayed by exhibitors. The authorities, placing their trust in the weather, and taking no precautions against contingencies, the success of the whole undertaking has been imperilled."——The newspaper called the *Week's News*, of which some nine volumes have been published, will cease to appear in its present form after July 12, arrangements having been made to incorporate it with *Brief*, the well-known weekly epitome of the Press, published by Wyman & Sons. *Brief*, which has many features in common with the *Week's News*, is noted for its able summary of the news of the week, and for the fact that its contents are carefully edited, epitomised, and classified under separate headings.

## Miscellanea.

**Japanese Art and Literature.**—A numerously-attended meeting of ladies and gentlemen interested in the art, literature, and folk lore of Japan took place on the 4th inst. at the house of the Royal Asiatic Society in Albemarle-street. Sir Rutherford Alcock occupied the chair, and having called upon Mr. Pfoundes to explain the object of the gathering, that gentleman stated that he desired those present to consider the advisability of establishing in London a central institution, in order to bring into closer communication admirers and students of Japanese art, literature, and kindred subjects, to facilitate the collection, preservation, and dissemination of all information relative to Japan; to encourage European residents in the country and the Japanese themselves to collect the material for such knowledge; to endeavour to enlist the cordial co-operation of scientific and literary societies and of individuals in extending the usefulness of such an institution; to publish proceedings, notes, queries, and other matter; and generally to promote so interesting a branch of research and study as that afforded by so unique a country as Japan. The proposal was supported by the distinguished chairman, by Mr. E. J. Reed, M.P., Mr. C. Rogers, Mr. R. N. Cust, Mr. Stewart Lane, Mr. J. Park Harrison, and Mr. H. A. Freeland; and eventually it was decided that a committee be formed to consider and report upon the matter.

**Architects to the Bank of Ireland.**—Messrs. Millar and Symes have been elected architects to the Bank of Ireland, the post being vacant by the resignation of the late architect. There were upwards of twenty-five candidates. The post is worth 300*l.* per annum, with percentage on cost of all new banks, and does not necessitate the giving up of other business. Those gentlemen have brought to a satisfactory completion important works in Dublin and in different parts of the country.

**The Holborn Union Infirmary, Holloway.**—The new infirmary for the Holborn Union, Archway-road, Upper Holloway, was opened on Saturday last by the Right Hon. G. Sclater-Booth, President of the Local Government Board. The building, of which Mr. H. Saxon Snell is the architect, was recently described in the *Builder* (p. 227, *ante*), and our description was accompanied by a view of the building and a plan of the principal floor.

**The Manchester Steel Screws.**—Thanks to Bessemer, steel is taking the place of iron in many directions with great advantage. The application of it to the making of screws is largely carried on by the Manchester Steel Screw Company, at their Screw Works, Bradford Mills, near Manchester. At these works upwards of 700 different sorts of screws are made, including brass and iron screws with variously-shaped heads, and adapted to every purpose. The speciality here, however, is the "Patent Gimlet-pointed Steel Wood Screw." The threads are all cut by a new process, and the gimlet-point causes these screws to enter the hardest wood without a hole having been previously made. The company use best quality Bessemer steel exclusively for the production of these screws, the great strength and tenacity of this material rendering the screw very difficult to bend or break. As a matter of fact, steel screws are capable of sustaining as great a strain as an iron screw two sizes larger in diameter, and a saving of something like 20 per cent. is effected by using steel screws over iron ones. These wood screws are made in all the usual sizes, and are very superior to the ordinary screw. The screw-formed letters of the company's advertisement have probably already attracted the attention of many of our readers.

**Burslem New Market.**—The new vegetable market here, which has just been completed, is one of the best of its kind in the Pottery district. The roof is of curvilinear form, of wrought iron, and is supported on twin columns with ornamental capitals. On the crown of the roof is a lantern light running the whole length of the building, and affording means of ventilation. The area covered is 1,800 square yards, of which 420 yards are covered by six shops abutting on Queen-street, the total length of frontage in this street being 125 ft. The roof already referred to is one large span. The glazing is done on the patent method invented by Mr. W. E. Rendle, of Westminster-chambers, London. The advantage of this system is that it dispenses with the use of putty or other cement, and no painting is required; some small vertical tubes take the place of the large and heavy sash-bars used on the old system. The contractors for the brick and stone work are Messrs. J. & R. Inskip, of Longton, Messrs. Hill & Smith supplying the iron roof. The market will cost 25,000*l*. The whole work has been carried out under the superintendence of Mr. E. M. Richards, the borough surveyor, who designed the building.

**Accident to a Gas-holder at Dartford.**—The large iron water-tank in which the gas-holder floated, from some unexplained cause suddenly gave way, the water rushed out, and the gas-holder, losing its support, was literally crumpled up, and presented the appearance of a huge bandbox which had been crushed. At once the gas escaped, and, what was remarkable, ignited, although no light whatever, it is stated, was near it to cause combustion. To account for this it is supposed that in the sudden collapse of so much ironwork some of the parts must have struck together and produced a spark which fired the gas as it made its way out of the rents in the holder. The statement in some of the newspapers that the gas-holder had exploded was erroneous, and calculated to excite unnecessary alarm on the part of persons living near gasworks.

**Lifts.** — A hydraulic passenger-lift has lately been fitted up by Messrs. R. Waygood & Co. at Leadenhall House, Leadenhall-street, and is one of the best of its kind. It is a direct-acting lift, worked from an accumulator, which is supplied from a set of double-action hydraulic pumps which are arranged on the same bedplate with the double engines, forming a very neat and compact arrangement. The ram is 3¼ in. in diameter. The pressure is about 700 pounds on the square inch. The lift, when working, is capable of going up 60 ft. (the height of the building), fully loaded, in fifteen seconds.

**Improved Cramps.**—A cramp has been patented by Mr. H. C. Tucker, of Peterborough, which we are disposed to think will recommend itself to the building trade as being a specially good floor-cramp. The sliding jaw is the great novelty. It fastens itself on the bar without assistance directly the pressure is applied by the screw. It may be used either as bench or floor cramp, and, being simple in construction, it cannot easily get out of order.

**London and Middlesex Archæological Society.**—On the 3rd inst., the members of this society met at St. Saviour's Church, Southwark. Lord Talbot de Malahide presided, and the first paper read was on the "Architectural History of the Priory Church," as St. Saviour's was called before the Reformation. It was by Mr. Francis T. Dollman, F.R.I.B.A., who pointed out the noticeable features and monuments of the building, and traced its vicissitudes from epoch to epoch from its second foundation, in 1106, when it was transferred from the secular to the regular clergy, down to our own times. The next paper was on the "Brandons of Southwark and their Palace opposite St. George's Church," by Mr. Rendle, F.R.C.S. Mr. Rendle made some preliminary remarks upon the Southwark of the sixteenth and seventeenth centuries, and on the more noted places from London Bridge to the site of the palace. The Society afterwards crossed London Bridge and visited the church of St. Mary-at-Hill, Billingsgate, of which a short account was given by the rector, the Rev. Arthur Trower, M.A.

**Royal Italian Opera.** — Following the example of his father, Mr. Gye has left till the close of his season the production of his chief novelty. We could never discover the wisdom of this course, but doubtless experience has justified it or it would not have been followed so long. "Il Re di Lahore," to which we are alluding, has proved a success, and will keep the English operatic stage. It has been produced with seldom-equalled splendour, and the music, though more remarkable for colour than form, so to speak, presents some grand *ensembles*. M. Lassalle, as *Scindia*, especially distinguishes himself.

**English Workmen in Russia.** — The Russian Imperial Technical Association has presented a memorial to the Minister of the Interior, calling his attention to the influx of foremen from foreign parts, and suggesting that steps should be taken to discover the reasons that lead them to compete so successfully with those of native birth. Throughout the greater part of the country the workmen employed in any trade requiring skill are found largely under the control of foreigners, and the Association estimates in the department of mechanics alone there are as many as 800 Englishmen.

**Thames Valley Drainage.**—At a public meeting held in Kingston on Wednesday night to discuss the action adopted by the Lower Thames Valley Main Sewerage Board, in re-adopting Colonel Haywood's scheme to establish a sewage farm at East Molesey, it was resolved to memorialise the Local Government Board, setting forth why the Joint Board should not be allowed to exercise borrowing powers, nor raise money for the purchase of land or the erection of works for sewage disposal.

**The Surrey County Surveyor.**—At a meeting of the Surrey Magistrates last week, the report of the Finance and General Purposes Committee contained a recommendation that the salary of the County Surveyor (Mr. C. H. Howell) be increased to 1,200*l*. per annum, to take effect from Lady-day last.

## TENDERS

For cottages at Bouley-street, Poplar. Messrs. J. & S. F. Clarkson, architects:—

| | |
|---|---|
| Salt | £745 0 0 |
| Sheffield & Prebble | 737 0 0 |
| Riddle | 670 0 0 |
| Simm | 650 0 0 |
| Lewis & Bostock | 537 0 0 |

For villa at Catford Bridge, for Mr. J. Mattinson. Mr. W. Stair, architect:—

| | |
|---|---|
| Sheffield & Prebble (accepted) | £1,220 0 0 |

For house at Catford Bridge, for Mr. H. H. Collins. Mr. A. D. Hutchins, architect:—

| | |
|---|---|
| Durford & Langham | £3,215 0 0 |
| Messom | 2,998 0 0 |
| Amer | 2,985 0 0 |
| Nightingale | 2,983 0 0 |
| Sheffield & Prebble | 2,743 0 0 |

For alterations to Nos. 32 and 34, Chrisp-street, Poplar, for Mr. E. Jones. Mr. J. T. Newman, architect:—

| | |
|---|---|
| Harris & Wardrop | £325 0 0 |
| Abrahams | 297 0 0 |
| Sheffield & Prebble (accepted) | 287 0 0 |

For house at Finchley, for Mr. A. D. Porter. Mr. John Slater, architect:—

| | |
|---|---|
| Sheffield & Prebble (accepted) | £1,712 0 0 |

For building pair of villa residences in Penge-lane, Sydenham, for Mr. W. Stimpson:—

| | |
|---|---|
| Kemp | £710 0 0 |
| Braggins (accepted) | 685 0 0 |

For the undermentioned schools, &c., for the Burton-on-Trent District School Board. Messrs. Giles & Brookhouse, architects. Quantities supplied:—

For schools at Stapenhall, to accommodate 200 girls and 200 infants, in two stories, with outbuildings, &c.:—

| | |
|---|---|
| Lilley & Son | £2,450 0 0 |
| Edwards | 2,400 0 0 |
| Hunter | 2,350 0 0 |
| Thompson | 2,300 0 0 |
| Mason | 2,255 0 0 |
| De Ville | 2,156 13 0 |
| Jones | 2,154 0 0 |
| Wileman | 2,135 0 0 |
| Chamberlain | 2,125 0 0 |
| Gallimore | 2,050 0 0 |
| Hodges & Wildman (accepted) | 2,040 0 0 |

For schools near Horninglow-road, to accommodate 200 boys, 200 girls, and 200 infants, boundary-walls and offices:—

| | |
|---|---|
| Thompson | £5,000 0 0 |
| Hunter | 4,725 0 0 |
| Mason | 4,600 0 0 |
| Wood Bros. | 4,580 0 0 |
| Gallimore | 4,547 0 0 |
| Hodges & Wildman | 4,495 0 0 |
| Wood | 4,422 0 0 |
| Chamberlain | 4,380 0 0 |
| Maddocks | 4,363 0 0 |
| Wileman | 4,360 0 0 |
| De Ville (accepted) | 4,305 0 0 |

For extension of infants' school, Victoria-road, for 120 children:—

| | |
|---|---|
| Edwards | £865 0 0 |
| Hunter | 860 0 0 |
| Chamberlain | 813 0 0 |
| Hodges & Wildman | 800 0 0 |
| Gallimore | 800 0 0 |
| Mason | 795 0 0 |
| Wood | 775 15 0 |
| Maddocks | 765 0 0 |
| Wileman | 748 0 0 |
| De Ville (accepted) | 749 15 0 |

For new school, for 200 girls, at Wellington-street:—

| | |
|---|---|
| Lilley & Son | £1,245 0 0 |
| Edwards | 1,165 0 0 |
| Hunter | 1,100 0 0 |
| Gallimore | 1,075 0 0 |
| Mason | 1,050 0 0 |
| Wood | 1,050 10 0 |
| Chamberlain | 1,036 0 0 |
| Hodges & Wildman | 1,015 0 0 |
| De Ville | 999 10 0 |
| Maddocks | 996 0 0 |
| Wileman (accepted) | 979 0 0 |

For the erection of a house, Garway, Herefordshire, for the Right Hon. Richard More O'Ferrall. Mr. Thomas Sutton, architect:—

| | |
|---|---|
| Kendrick (accepted) | £4,505 16 0 |

For building two houses and shops in the High-street, Hounslow, for Mr. H. Heath. Mr. R. Rutter, architect:—

| | |
|---|---|
| Daniels | £1,593 0 0 |
| Hiscock | 1,393 0 0 |
| Brunsden | 1,355 0 0 |
| Gamage | 1,350 0 0 |

For Masonic hall and club-rooms, Commercial-road, Landport. Mr. E. J. Smith, architect. Quantities by Mr. J. W. Stroud:—

| | |
|---|---|
| Cooper | £1,979 0 0 |
| Roberts | 1,960 0 0 |
| Burbidge | 1,890 0 0 |
| Cload | 1,880 0 0 |
| Bramble | 1,873 0 0 |
| Light | 1,841 0 0 |
| Hayter | 1,780 0 0 |
| Hyde | 1,600 0 0 |
| Taylor | 1,580 0 0 |
| Lewis (accepted) | 1,540 0 0 |

For dwelling-house for Mr. J. N. Ritchie, Church-end, Finchley. Mr. James Geo. Buckle, architect:—

| | |
|---|---|
| Russell | £410 0 0 |
| Cooper | 359 0 0 |
| Farthing & Niel (accepted) | 305 0 0 |

For finishing to houses, Pear-tree, Derby, for the Ambergate Brick Company. Mr. George R. Isborn, architect:—

| | |
|---|---|
| Thompson | £709 0 0! |
| Johnson | 574 15 0 |
| Dickenson | 485 0 0 |
| Shaw | 432 0 0! |

For new granary at Shad-Thames, Dockhead, Bermondsey, for Mr. G. H. Carbutt. Mr. Henry Carpenter, architect. Quantities by Messrs. Wm. Reddall & Son:—

| | |
|---|---|
| Browne & Robinson | £7,894 0 0 |
| Conder | 7,891 0 0 |
| Colls & Sons | 7,835 0 0 |
| Morter | 7,737 0 0 |
| Wall Bros. | 7,130 0 0 |
| Dove Bros. | 6,945 0 0 |
| Perry & Co. | 6,593 0 0 |
| Holland & Hannen | 6,525 0 0 |

For additions and alterations to the Carpenter's Arms, Kingsland-road, for Mr. F. W. Ayres. Messrs. W. Reddall & Son, architects. Quantities supplied:—

| | |
|---|---|
| Jackson & Todd | £525 0 0 |
| Eaton | 515 0 0 |
| Gill (accepted) | 470 0 0 |
| Wheeler | 397 0 0 |

For rebuilding the Acton Arms, Kingsland. Mr. W. Scott, architect:—

| | |
|---|---|
| Stamp & Bowtle | £2,390 0 0! |
| Cocks | 2,375 0 0 |
| Hearle | 2,097 0 0 |
| Mann | 2,068 0 0 |
| Steel Bros. | 1,875 0 0 |
| Beale & Co. | 1,795 0 0 |
| Tomlin & Chrisp | 1,683 0 0 |
| Palmer | 1,625 0 0 |
| Sheffield & Prebble (accepted) | 1,587 0 0! |

For house at Finchley, for Mr. H. W. Franklin. Mr. John Slater, architect:—

| | |
|---|---|
| Sheffield & Prebble (accepted) | £1,721 0 0 |

For the erection of villa residence, Nightingale-road, Wood-green, for Mr. R. Colyer. Mr. J. P. Johnson, architect. Quantities not supplied:—

| | | | |
|---|---|---|---|
| Mattock Bros. | £997 | 0 | 0 |
| Lidstone & Son | 898 | 0 | 0 |
| Veller & Hamblin | 868 | 0 | 0 |
| Wood Bros. | 863 | 0 | 0 |
| Pecock | 855 | 0 | 0 |

For extension of outfall works and settling tanks, at Llanrwst. Mr. Thomas Roberts, engineer:—

| | | | |
|---|---|---|---|
| Jeffreys | £1,316 | 17 | 0 |
| Davies | 1,128 | 0 | 0 |
| B. Jones | 1,025 | 0 | 0 |
| Bugbird | 900 | 0 | 0 |
| Owen | 898 | 18 | 0 |
| Hughes | 886 | 0 | 0 |
| Jones | 840 | 0 | 0 |
| Jones & Son* | 734 | 0 | 0 |

* Accepted, subject to modification.

For additions and alterations at West-end Schools, Aldershott, for the Aldershott School Board. Mr. James Gibson, architect:—

| | | | |
|---|---|---|---|
| Cranstone | £1,856 | 0 | 0 |
| Diamond | 1,795 | 0 | 0 |
| Sebright | 1,583 | 0 | 0 |
| Hughes | 1,465 | 0 | 0 |
| Mesher | 1,440 | 0 | 0 |
| Garland | 1,377 | 0 | 0 |
| Martin, Wells, & Co. (accepted) | 1,350 | 0 | 0 |

For three houses and an addition to Barry-villa, Barry-road, Peckham-rye, for Mr. Joseph Wood. Mr. C. W. Lovett, architect and surveyor:—

| | | | |
|---|---|---|---|
| Wood Bros. | £2,660 | 0 | 0 |
| Tyerman | 2,450 | 0 | 0 |
| Acock Bros. | 2,275 | 0 | 0 |
| Buckland & Co. | 2,198 | 0 | 0 |
| W. & F. Croaker | 2,127 | 0 | 0 |
| Eldridge & Gee (accepted) | 2,010 | 0 | 0 |

For pulling down and rebuilding house and shop, 72, Rye-lane, Peckham, for Mr. Francis Austin. Mr. C. W. Lovett, architect:—

| | | | |
|---|---|---|---|
| Boadnam & Co. | £911 | 8 | 0 |
| Minard | 909 | 0 | 0 |
| Tyerman | 897 | 10 | 0 |
| Terry | 875 | 0 | 0 |
| Linfield | 848 | 0 | 0 |
| Smith | 773 | 0 | 0 |
| Buckland & Co. (accepted) | 727 | 0 | 0 |

For four detached villas in Woodchurch-road, West Hampstead. Mr. Banister Fletcher, architect. No quantities supplied:—

Whiteman (accepted).

For detached villa, Canfield-road, West Hampstead. Mr. Banister Fletcher, architect:—

| | | | |
|---|---|---|---|
| Castle | £1,845 | 0 | 0 |
| Wagner (accepted) | 1,834 | 0 | 0 |

For eight semi-detached villas, Streatham, for Mr. Robert Yeo. Mr. Banister Fletcher, architect. No quantities supplied:—

| | | | |
|---|---|---|---|
| Hobbs | £5,776 | 0 | 0 |
| Mason | 4,388 | 0 | 0 |
| Hobern (accepted) | 3,931 | 0 | 0 |
| Prout | 3,930 | 0 | 0 |

For ten semi-detached villas in Canfield-road, West Hampstead. Mr. Banister Fletcher, architect:—

| | | | |
|---|---|---|---|
| Castle | £11,789 | 0 | 0 |
| Hobern | 11,550 | 0 | 0 |
| Prout | 10,980 | 0 | 0 |
| M'Cowan | 8,450 | 0 | 0 |

For alterations and repairs at the Lord Raglan, Hammersmith, for Messrs. Fuller, Smith, & Turner. Mr. W. Nunn, architect:—

| | | | |
|---|---|---|---|
| Mansell | £291 | 0 | 0 |
| Chamberlain | 279 | 0 | 0 |
| Hunt | 271 | 0 | 0 |
| Nye | 265 | 10 | 0 |
| Lamble (accepted) | 262 | 0 | 0 |

For alterations and repairs to the Jews' Orphan Asylum, Whitechapel. Mr. Charles J. Jones, architect:—

| | | | |
|---|---|---|---|
| Toms (accepted) | £1,970 | 0 | 0 |

For the erection of two pairs of small villa residences in the Ladbroke-road, Epsom, for Messrs. Williams & Blomfield. Mr. A. F. Williams, architect:—

| | | | |
|---|---|---|---|
| Walker (accepted) | £1,600 | 0 | 0 |

For building two villa residences, Upper Tyson-road, Forest-hill, for Messrs. Bailey & Co. Messrs. Waterson, architects:—

| | | | |
|---|---|---|---|
| Warman | £1,790 | 0 | 0 |
| Macey | 1,740 | 0 | 0 |
| Braggins (accepted) | 1,720 | 0 | 0 |

For building two villa residences, Upper Tyson-road, for Messrs. Bailey & Co. Messrs. Waterson, architects:—

| | | | |
|---|---|---|---|
| Warman | £1,930 | 0 | 0 |
| Macey | 1,880 | 0 | 0 |
| Braggins (accepted) | 1,850 | 0 | 0 |

For Sunday schools, Bromley, Kent. Mr. John Sulman, architect:—

| | | If Pitch-Pine. |
|---|---|---|
| Cox | £3,350 | £150 |
| Staines | 3,284 | 136 |
| Amand | 3,250 | 65 |
| Crossley | 3,180 | 57 |
| Grubb | 3,079 | 112 |
| Bowyer | 3,070 | 118 |
| Tibbet | 3,050 | 60 |
| Smith | 2,999 | 109 |
| Taylor & Son | 2,930 | 107 |

For works of water supply and sewerage, for the Llanrwst Sanitary Authority. Mr. Thomas Roberts, engineer:—

| | Trefriw. | | | Dolwyddelin. | | | Penmachno. | | |
|---|---|---|---|---|---|---|---|---|---|
| S. P. Owen | £2,218 | 7 | 3 | £3,378 | 17 | 9 | £2,630 | 13 | 3 |
| Davies | 2,172 | 8 | 7 | 1,956 | 4 | 2 | 2,112 | 2 | 0 |
| Bugbird | 2,057 | 0 | 0 | 1,930 | 5 | 0 | 1,642 | 0 | 0 |
| Hughes | 1,846 | 0 | 0 | 1,869 | 0 | 0 | 1,869 | 0 | 0 |
| J. B. Jones | 1,863 | 0 | 0 | 1,871 | 0 | 0 | 1,636 | 0 | 0 |
| R. Jones | — | | | — | | | 1,600 | 0 | 0 |
| Parry | 1,923 | 0 | 0 | — | | | — | | |
| O. E. Owen* | 1,537 | 0 | 0 | 1,516 | 0 | 0 | 1,530 | 0 | 0 |

* Accepted.

For No. 8, City Warehouses, corner of Fore-street and Cripplegate-buildings, for M. de Costa Andrade. Mr. G. Somers Clarke, architect. Quantities by Mr. Charles G. Maylard and Mr. James Schofield:—

| | | | |
|---|---|---|---|
| Haward Bros. | £38,115 | 0 | 0 |
| Baker | 33,535 | 0 | 0 |
| Lucas Bros. | 33,497 | 0 | 0 |
| Smith & Co. | 33,195 | 0 | 0 |
| Brass | 31,443 | 0 | 0 |
| Holland & Hannen | 31,437 | 0 | 0 |
| Manley (accepted) | 30,875 | 0 | 0 |

For the erection of Schools, St. Clement's-road, Nottinghill (Chelsea Division). Mr. E. R. Robson, architect. Quantities by Messrs. Gardiner, Son, & Theobald:—

| | | | |
|---|---|---|---|
| Wall Bros. | £7,579 | 0 | 0 |
| Thompson | 6,871 | 0 | 0 |
| Lathey Bros. | 6,865 | 0 | 0 |
| Rankin | 6,700 | 0 | 0 |
| Higgs & Hill | 6,684 | 0 | 0 |
| Williams & Son | 6,638 | 0 | 0 |
| Pritchard | 6,523 | 0 | 0 |
| Tongue | 6,499 | 0 | 0 |
| Hook & Oldrey | 6,425 | 0 | 0 |
| C. Wall | 6,097 | 0 | 0 |

For building a factory, for Messrs. Mullon Bros., Penn-street, Hoxton. Mr. Henry Lovegrove, architect:—

| | | | |
|---|---|---|---|
| Martin | £2,977 | 0 | 0 |
| Browne & Robinson | 2,870 | 0 | 0 |
| Tarrant | 2,484 | 0 | 0 |
| Bangs | 2,468 | 0 | 0 |
| Stimpson | 2,465 | 0 | 0 |
| Woodward | 2,435 | 0 | 0 |
| Nightingale | 2,376 | 0 | 0 |
| Grover | 2,244 | 0 | 0 |
| Scrivener | 2,231 | 0 | 0 |

For the erection of a depôt, for Messrs. Carter, Paterson, & Co., Penge. Mr. Wm. Eve, architect:—

| | | | |
|---|---|---|---|
| Hubble & Trott | £3,381 | 0 | 0 |
| Abraham | 2,890 | 0 | 0 |
| Sheffield & Prebble | 2,851 | 0 | 0 |
| Rowe | 2,848 | 0 | 0 |
| Colls & Sons | 2,780 | 0 | 0 |
| Hunt | 2,767 | 0 | 0 |
| Harris & Wardrop (accepted) | 2,765 | 0 | 0 |

For the erection of a warehouse, Upper Thames-street. Mr. William Wimble, architect:—

| | | | |
|---|---|---|---|
| Brass | £4,398 | 0 | 0 |
| Hoare & Son | 4,315 | 0 | 0 |
| Ashby & Horner | 4,185 | 0 | 0 |
| Falkner | 4,147 | 0 | 0 |
| Scrivener & Co. | 3,934 | 0 | 0 |
| Croaker | 3,889 | 0 | 0 |
| Crabb | 3,798 | 0 | 0 |
| Morter | 3,753 | 0 | 0 |

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